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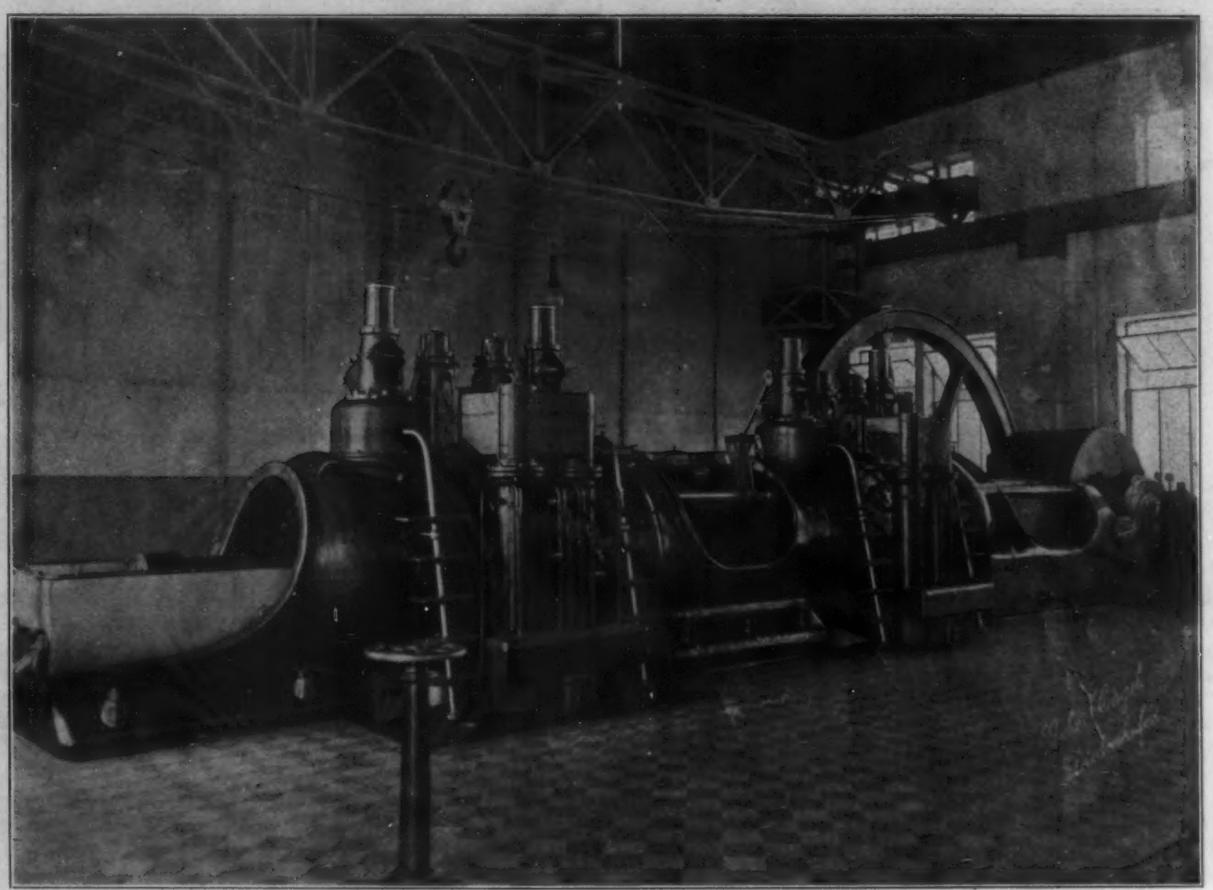
VOLUME XIX. SAN FRANCISCO, CAL., JULY 20, 1907 No. 3

NEW GERMAN TANDEM DOUBLE-ACTING GAS ENGINES

The tandem double-acting, high-power gas engine is now taking the place of the older type of single-acting engines which were not able to supply sufficient power for service in iron and steel works for a given space occupied, and a given first cost per horsepower of output.

At the electric power station in Friedens Hutte near Mordenroth, there is a 600-horsepower, double-acting twin gas engine operating on blast-furnace gases. This unit of the Oberschles Eisenbahn-Bedarfs-Aktien-Gesellschaft is directly coupled to a 3-phase, 5-wheel generator of 580 kilowatts capacity. This Drehstrom dynamo was built by the Allgemeine Elektricitats Gesellschaft, at Berlin, Germany, and supplies a current of 500 volts pressure for operating the various machine tools of the iron and steel plant.

As an example of the earlier blast-furnace gas engines of the single-acting type may be mentioned three units of 600 horsepower, each operating on blast-furnace gases at Burbach, near Saarbruck, at the power house of the Luxenburger Berg Werks-Und Saarbrucker Eisenhutten-Aktien-Gesellschaft. These engines wee constructed at Deutz, near Cologne, by the Gasmotoren-Fabrik Deutz.



600 H. P. BLAST FURNACE GAS ENGINE

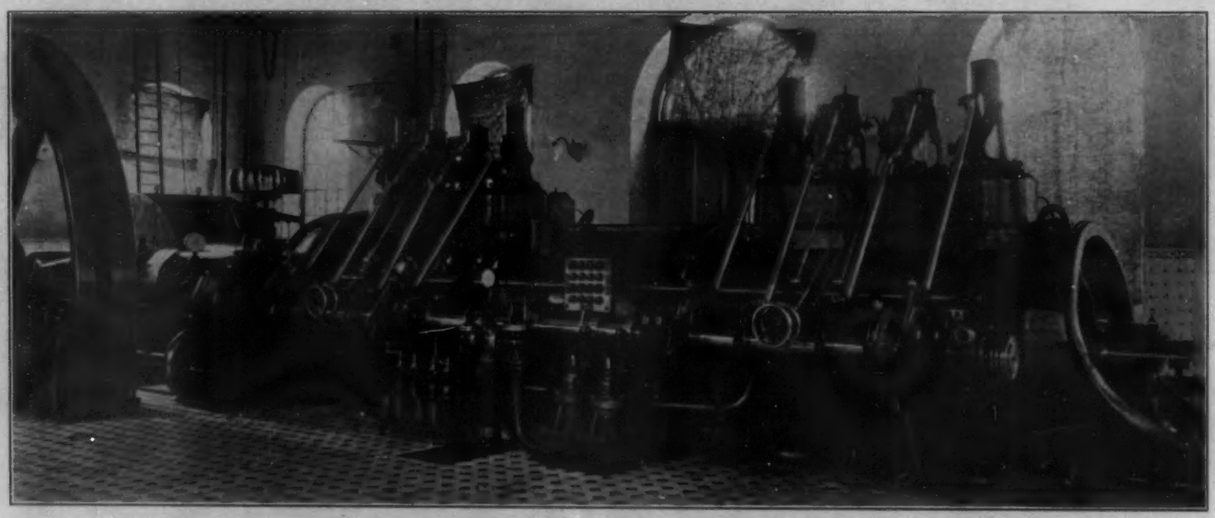
The electric-power generating equipment of the Burbacher Hutte has recently been supplemented by a new high-power tandem gas engine of the double-acting type, constructed by the Vereinigte Maschinenfabrik Augsburg ung Maschinenbaugesellschaft Nurnberg A.-G. This double-acting tandem gas engine is directly coupled to a double-commutator, direct-current dynamo, constructed by the

Siemens-Schuckert Werke, of Berlin, Germany. This electrical generator supplies a continuous current of 2x2025 amperes at a pressure of 2x240 volts, this double-commutator dynamo having a capacity of 980 kilowatts at a speed of 100 revolutions per minute. This high-power, double-acting tandem gas engine of the Nurnberg type has a total output of 1,500 horsepower, and is operated entirely on coke-oven gases.

The first equipment of the original central power station of the Burbacher Hutte included three twin, single-acting Deutz engines operating on waste blast-furnace gases and directly coupled to multipolar continuous-current dynamos, constructed by Schuckert & Company, of Nurnberg.

These dynamos were of 420 kilowatts capacity each, and were driven by the gas engines at a speed of 140 revolutions per minute by direct connection. Each direct-current generator supplied a current of 1,740 amperes at a pressure of 240 volts.

Another new German four-cycle gas engine, shown in the accompanying figures, is built by Ehrhardt & Sehmer, of Schleifmuhle, Port Saarbrucken. This engine has a stroke of 750 mms. in diameter. Its speed is 150 revolutions per minute, and it has a capacity of 600 brake horsepower. These large gas engines are constructed on the well-tried four-cycle principle, and are double-acting, the complete cycle taking place on each side of the piston.



600 H. P. TANDEM DOUBLE-ACTING GAS ENGINE

There is an explosion every revolution in a single-cylinder engine on this principle, while in the case of a double cylinder of either tandem or parallel construction an impulse takes place every stroke; or, in other words, there is a continuous turning moment on the crank shaft. When the engine is arranged with the cylinders tandem, the unexploded gases are used as a cushion to the inertia of the moving parts in exactly the same way as in a single-cylinder steam engine.

There is a slight advantage as regards accessibility of gear with the parallel design. In cases of absolute necessity it can be run as a single-cylinder engine, while this can only be done with difficulty on the tandem design. In an engine with four cylinders, arranged tandem and parallel, the advantages of both systems are combined, and this design is highly advantageous where large power is required, and exceptionally even working is attained. These engines are said to be especially suitable for electrical-power generation, owing to the heavy fly-wheel in conjunction with the sensitive and steady governor used, and are also well suited to driving high-speed, direct-coupled pumps, either coupled to the back end of the piston rod, or direct to the crank-shaft, also the combination for blast-furnace work, of a blowing cylinder coupled in the former manner and fitted with special air valves, has proved a very efficient combination, giving a mechanical efficiency of eighty-one per cent. in the air cylinder.

The cylinder being the most important element of the machine, the greatest care and attention is said to have been expended on its construction and design. The cylinder and water jacket being cast in one piece and so arranged that some of the stresses on the cylinder walls are taken by the jacket, the water-cooling space being large enough and care being taken to make all parts accessible and to render cleaning and inspection easy.

There is said to be no chance of warping, internal strains or vibration, the whole design of the engine tending to prevent these as the chief working stresses in the engine are absolutely evenly divided and parallel to the main axis of the cylinder. The experience of this firm in building high-pressure pumps has been of great service to them in designing the cylinder openings, great care being taken in the cooling of their junctions to the cylinder walls. The covers are the same, back and front, and as the diameter of the distance piece, frame and back guide connection are larger than the flanges of the cylinder covers, these latter can easily be moved along the piston rod, thus allowing easy inspection or the removal of the piston at either end of the cylinder. The cross-head guide is open at the top.

The piston is made very light, and is cast in one piece from cast-iron, and is fitted with self-expanding cast-iron rings. The construction of the piston is such that the lubricant is distributed evenly to the cylinder walls. A piston rod carries the piston, this being guided and supported at both ends of the cylinder. Both piston and rod are internally water cooled, the water being introduced through an axial boring in the piston rod and carried away in the same manner. This cooling has proved to be most efficient, and in spite of protracted running it is said that it is not necessary to adjust the stuffing-box glands which are fitted to the water circulation. The piston rod itself is fitted at the stuffing boxes with metallic packing, which is free to move radially.

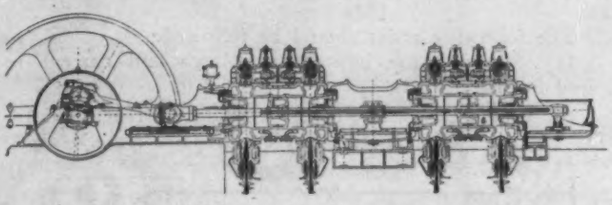
The back guide and distance piece are designed to allow the easy removal of the cylinder covers, which are also fitted with slides on which work slide blocks carry-

ing the weight of piston and piston rod.

The valve gear was designed for a constant mixture ratio between gas and air with whatever load the engine was running under, so as to reduce the reaction on the governor as much as possible. To attain this the German engineers arranged that there should be a main inlet valve with a constant lift, while the governing of the charge should be effected by means of a special mixture or regulating valve, the area of the passage through this valve being controlled by the governor in such a manner that at any load, the ratio of gas to air should remain nearly constant. This insures reliable ignition, however small the charge may be, and a very low consumption of gas at any cut-off. The ratio of the mixture can be varied quickly within wide ranges, according to the quality of the gas being used, without any difficulty or special apparatus, and without throttling the total charge, so that the engine can be switched off from blast-furnace gas to coke-retort gas, or to any other quality. The exhaust valves are very accessible, as by removing the cylinder covers they can be inspected and cleaned. The gas cylinders are suspended and the space underneath them is not encumbered with cylinder feet and pipes, and in consequence there is plenty of room for getting out the exhaust valves, if necessary.

A separate electro-magnetic ignition apparatus is provided at each end of the cylinder, insuring reliable ignition, rapid combustion of the mixture, and uninterrupted running. The instant of firing can be adjusted separately for each apparatus, or all can be adjusted together, according to the load and number of revolutions of the engine.

The lubrication is now regarded as one of the most important points in connection with a gas engine. In this



NEW GERMAN DOUBLE-ACTING TANDEM GAS ENGINE

engine the principal working parts, such as the main bearings, etc., are supplied with oil under pressure. This pressure is readily adjusted, and consequently the quantity of oil. A pump actuated by the engine, serves as a feed. Arrangements are made for collecting the waste oil, cleaning it, and then returning the same to the feed pump. All these operations are automatic, and require no attention on the part of the attendant. Parts exposed to the pressure of the explosion and high temperature, such as the cylinder, piston, stuffing boxes, piston rod, and exhaust-valve spindles, are provided with separate lubricating pumps.

In addition to the above-mentioned cooling of the piston and piston rod, all other parts exposed to high temperatures are also provided for in this respect. Generally from thirty to forty feet of head are sufficient for this cooling, only that of the piston requiring a pressure of about fifty pounds per square inch, according to the size and number of revolutions of the engine. When such a head is not available a special pump is fitted for this purpose. As usual, compressed air is employed for starting the engine, the supply and adjustment of the air inlet and exhaust being effected by automatic gear. For setting the engine in its starting position and adjusting the valve gear, an electrically-driven barring gear is installed.

TRANSFORMER TESTING FOR CENTRAL STATIONS.*

(Continued.)

Core Loss.

When a transformer is connected to a source of alternating electromotive force, a loss of energy takes place in the iron, due to cycle reversals of magnetic flux. This loss of energy is known as the core loss, and, together with the magnetic induction in the core, is supplied to the transformer by the exciting current.

Two methods are available for the measurement of core loss. In the first method (Fig. 5) the voltmeter and

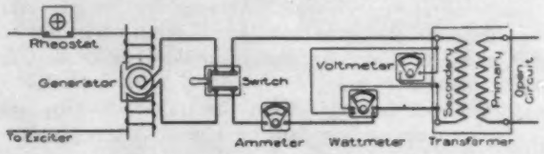


FIG. 5.—FIRST METHOD OF DETERMINING CORE LOSS

pressure coil of the wattmeter are connected directly to the terminals of the transformer in test. In the second method (Fig. 6) the current coil of the wattmeter is inserted between the terminal of the transformer in test and the terminal of the transformer in test and the terminal of the voltmeter and pressure coil of the wattmeter. Both methods introduce errors. The first method introduces the larger error but permits of easy and accurate correction, so that in all cases it gives more nearly accurate results. The second method, while introducing a smaller error, allows no easy method of correction. It is, however, more convenient, and for the measurement of large core losses for commercial purposes, is sufficiently accurate.

The test in either case requires an alternating-current wattmeter, ammeter and voltmeter, a tachometer or speed counter, and thermometers, together with a source of alternating current at the required voltage and frequency.

The core loss should be measured from the low potential side of the transformer, to avoid the introduction of high voltage in the test.

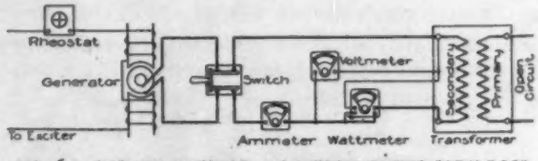


FIG. 6.—SECOND METHOD OF DETERMINING CORE LOSS

First Method.

(1) Estimate the capacity of the instruments required. (See following example.)

(2) Connect the selected instruments, as shown in Fig. 5, to the low potential side of the transformer in test, the high potential side being on open circuit. Arrange for the observation of the generator's speed by a tachometer or speed counter. Place a thermometer on the core of the transformer.

(3) Connect leads from the transformer in test to the leads from the switchboard or sources of power through a double-pole, single-throw switch.

(4) Close the switch and make a preliminary reading of the instruments at approximately the voltage and frequency required.

*Condensed from Bulletin No. 1317, General Electric Company.

(5) Adjust the voltage and frequency of the circuit as desired, and make simultaneous observations of the wattmeter, voltmeter, ammeter, and tachometer. Observe the temperature of the transformer.

(6) Record the results, note the numbers of the instruments used, their constants and the type of generator used (which should carry no other load during the test).

(7) Calculate the losses in the voltmeter and the pressure coil of the wattmeter (see following example), and subtract them from the observed reading of the wattmeter (5). The result is the core loss of the transformer. The ammeter indicates the exciting current.

Second Method.

(1) Estimate the capacity of the instruments required. (See example, First Method.)

(2) Connect the instruments, as shown in Fig. 6, to the low potential side of the transformer in test, the high potential side being on open circuit. Arrange for the observation of the speed of the generator by a tachometer or speed counter, and attach a thermometer to the core of the transformer.

(3) Connect the leads from the transformer in test to the leads from the switchboard or source of power, through a double-pole, single-throw switch.

(4) Close the switch and make preliminary readings of the instruments.

(5) Adjust the voltage and frequency of the circuit as desired, and make simultaneous observations of the wattmeter, ammeter, voltmeter, and tachometer. Note the temperature of the transformer.

(6) Record the results, note the numbers of the instruments, their constants, and the type of generator used.

The reading of the wattmeter in (5) is the core loss of the transformer, and the reading of the ammeter, the excitation current.

Measurement of Resistance.

The resistance of the primary and secondary of a transformer must be known before the efficiency or regulation can be calculated. For commercial purposes it is most conven-

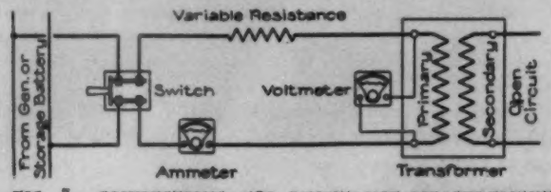


FIG. 7.—CONNECTIONS FOR RESISTANCE MEASUREMENT

iently and accurately measured by the fall of potential method. In this method the current, I, and the voltage, E, are observed, and the resistance, R, calculated from Ohm's law, $I=\frac{E}{R}$.

The measurement requires continuous current from a generator (or better, a storage battery), and a continuous-current voltmeter and ammeter. Suitable resistances or rheostats will be necessary for adjusting the voltage.

The following order should be followed in making the tests:

(1) Estimate the resistance to be measured and select suitable instruments.

(2) Connect the instruments, as shown in Fig. 7. Place a thermometer on the coil to be measured. Connect leads from the transformer in test to the source of current through the switch.

(3) Close the switch and make a preliminary reading of the instruments; then carefully adjust the voltage and take simultaneous readings of the voltmeter and ammeter. Additional readings should be taken at slightly different voltages. Note the temperature of the coil.

(4) Record results; correct readings, if necessary, and take their average.

(5) Calculate the resistance from the equation $R=\frac{E}{I}$, and reduce to some standard temperature as, for example, twenty-five degrees Centigrade.

Impedance.

The well-known expression, $I=\frac{E}{R}$, for continuous-current circuits, is replaced in alternating-current circuits by the equivalent expression $I=\frac{E}{\sqrt{R^2+(2\pi nL)^2}}$ where I is the current, E the impressed E. M. F., in the frequency, L the co-efficient of self induction, and R the effective resistance of the circuit. For commercial purposes R may be considered as the ohmic resistance of the circuit. The expression $\sqrt{R^2+(2\pi nL)^2}$ is known as the "impedance" of the circuit, and is defined as the apparent resistance of a circuit containing ohmic resistance and self induction. The term $2\pi n L$ is called the "reactance" of the circuit.

Impedance in an alternating-current circuit is thus analogous to resistance in a continuous-current circuit. The impedance of a transformer is measured by short circuiting one of the windings, impressing an alternating E. M. F. on the other winding and making simultaneous measurements of current and impressed voltage. E and I thus being observed, the impedance can be calculated from the above equation. Impedance thus obtained includes that of both primary and secondary windings.

Impedance may be considered as constant at all loads. It is generally measured at full load current, and the impressed voltage is then known as the "impedance volts," and when expressed in per cent. of the voltage of the transformer, as the per cent. "impedance drop."

An alternating-current voltmeter and ammeter, a tachometer, and a source of alternating current, together with rheostats for adjusting the voltage, are required for the test.

The following order should be followed:

(1) Estimate the impedance voltage and current required for the test.

(2) Short circuit one of the windings of the transformers. (Secondary is generally preferable. See Note.)

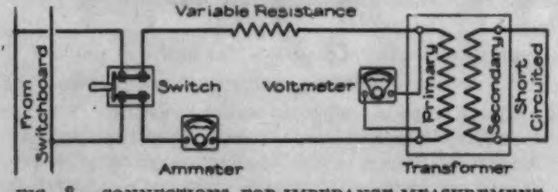


FIG. 8.—CONNECTIONS FOR IMPEDANCE MEASUREMENT

(3) Connect the instruments, as shown in Fig. 8. Connect the transformer leads to the source of power through the switch.

(4) Close the switch and make preliminary readings of the instruments.

(5) Adjust the voltage to give full load current in the winding of the transformer; then make simultaneous readings of the voltmeter, ammeter and tachometer. Take several successive readings of the instruments, to eliminate errors.

(6) Record the results, correct them if necessary, and average the readings.

(7) Calculate the impedance from the equation given above. Express the impedance volts in per cent. of the transformer voltage.

Heat Test.

The heat test on the transformer may be conducted in

several ways, all of which are designed to approximate as nearly as possible the working conditions of the transformer.

First Method.

The primary of the transformer may be connected to a circuit of the proper voltage and frequency, and the secondary loaded with lamps or a water rheostat until full load current is obtained. The temperature of the external portions of the coils, the laminations, the frame, and the oil (if oil be used) may be determined from thermometer readings, and the temperature rise of the windings by the increase in their resistance. The test should be continued until approximately constant temperatures are reached. If readings of the thermometer and measurements of resistance are made at intervals during the test, the results may be plotted.

The objection to loading the transformer, as described, is the power required for the test, and the following method is therefore preferable.

Second Method.

If two transformers of the same voltage and capacity are available, a heat test may be taken on the two by what is

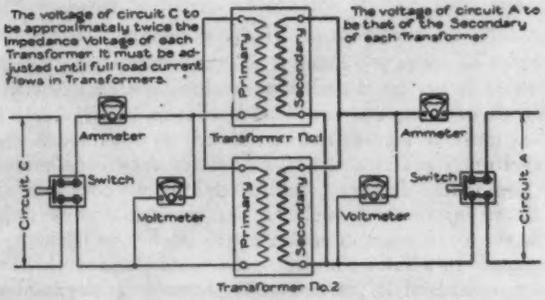


FIG. 9.—MOTOR GENERATOR METHOD OF MAKING HEAT TEST ON TRANSFORMERS

known as the "Motor-Generator" method. Fig 9 shows two transformers connected for the test. The two secondaries are connected in parallel and are excited from circuit A at the proper voltage and frequency, consequently normal voltage is induced in each primary. The two primaries are connected in series, but in such a way as to oppose each other. Notwithstanding the fact that full primary voltage exists at the terminals of each transformer, the resultant voltage at the terminals of Circuit C is zero. Any voltage impressed at C will then produce current independent of the voltages at the transformer terminals. Since each transformer is in effect short circuited by the other, it follows that approximately twice the impedance voltage of one transformer impressed at C will cause full load current to flow through the primaries and secondaries of both. Under these conditions, the transformers will run at full load, while the total energy required for the test amounts to merely the losses in the two. The circuit A supplies the excitation current and core losses, the circuit C the full load current and copper losses.

Circuits A and C may be supplied from two independent generators or from the same generator, giving current at the required frequency. In the former case the voltage of each circuit may be independently controlled by adjustment of the field of each generator; while in the latter, transformers will be necessary in order to obtain the different voltages required at A and C, and in addition, rheostats or some other regulating device will be required in each circuit in order that the voltage at A may be accurately adjusted, and that at C varied until full load current flows in the primaries of the transformers.

Efficiency.

The efficiency of a transformer is the ratio of its net power output to its gross power input, the output being measured with non-inductive load. The power input includes the output together with the losses, which are as follows:

(1) The core loss, which is determined by test at the rated frequency and voltage.

(2) The $I^2 R$ loss of the primary and secondary calculated from their resistances.

Regulation.

In transformers the regulation is the ratio of the rise of secondary terminal voltage from full load to no load (at constant primary impressed terminal voltage) to the secondary terminal voltage. It is given in percentage of the full-load value of secondary potential; i. e., the rated secondary potential.

Regulation may be determined by exciting the transformer at rated frequency and such a primary voltage that rated secondary voltage is obtained at full load, using lamps or a water rheostat as load. The increase in secondary terminal voltage from full load to no load is then observed, the primary voltage and frequency being kept constant throughout the test. This increase in secondary voltage, divided by the secondary full-load voltage, is then the regulation expressed in percentage.

This method is, however, unsatisfactory by reason of the small difference between the full load and no load values and the liability to error in measuring either of them.

Much more reliance can be placed on results calculated from separate measurements of reactive drop, resistance, and magnetizing current than on actual measurement of regulation.

Several methods have been proposed for the calculation of regulation. The following method, which has been developed in the engineering department of the General Electric Company, will be found simple and accurate:

Let IR = Total resistance drop in the transformer expressed in per cent. of rated voltage.

IX = Reactive drop similarly expressed.

P = Proportion of energy current in load, or "power factor" of load. For non-inductive load P = 1.

W = Wattless factor of primary current. (With non-inductive load, W = magnetizing current expressed as a decimal fraction of full-load current. With inductive load, W = Wattless component of load, plus magnetizing current.)

Secondary full load = 100%.

Secondary no load voltage = E.

For Non-inductive Load:

$$E = \sqrt{(100 + PIR + WIX)^2 + (IX)^2}$$

For Inductive Load:

$$E = \sqrt{(100 + PIR + WIX)^2 + (PIX - WIR)^2}$$

In each of these equations the last expression within brackets represents the drop "in quadrature."

The reactive drop expressed in per cent. =

$$IX = \sqrt{(\%\ \text{impedance drop})^2 - (IR)^2}$$

The magnetizing current =

$$\sqrt{\text{Exciting Current}^2 - \left(\frac{\text{Core loss}}{\text{Voltage}}\right)^2}$$

Polarity.

Transformers are generally designed so that the instantaneous direction of flow of the current in certain selected leads is the same in all transformers of the same type. For example, referring to Fig. 10, the transformer there shown is designed so that the current at any instant flows into lead A and out of the lead D. Some such system is necessary in order that transformers may run in parallel when similar

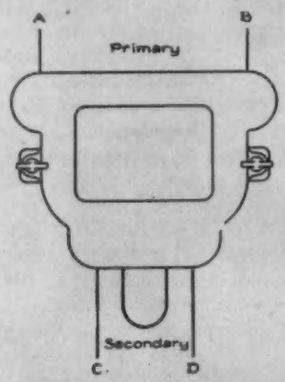


FIG. 10.—PLAN OF TRANSFORMER FOR SHOWING POLARITY RELATIONS

primary and secondary leads on different transformers are connected together. The test which is made to determine whether a given transformer is identical in this respect with other transformers of the same type, is known as the polarity test.

Ratio.

The ratio of the transformer is the numerical relation between the primary and secondary voltage. It can be determined by simultaneous observation of the primary and secondary voltage of the transformer at no load. The secondary voltage used for the test must be sufficient to be readable on the voltmeter, and the primary in a 10 to 1 or 20 to 1 transformer will thus be beyond the range of a standard voltmeter. A multiplier or a step-down transformer of known ratio may be employed, but an accurate determination of ratio can be made only with carefully calibrated instruments.

TUNGSTEN LAMPS FOR SERIES INCANDESCENT STREET LIGHTING SERVICE.

The General Electric Company desires to announce that it is ready to supply Tungsten lamps for series street lighting service. The application of incandescent lamps to street lighting service should be widely extended by reason of the advantages Tungsten lamps possess for this class of service. They can be supplied in low candlepower sizes, permitting distribution of lamps at frequent intervals, and thereby securing maximum economy with uniform and satisfactory lighting. The high efficiency now obtained by the Tungsten lamp will enable central station companies to compete successfully against any other form of street illuminant of low or moderate candlepower. Tungsten lamps are particularly adapted to series lighting service, as the lamps are employed in low voltages which permit the use of short, stable and durable filaments. G. E. Tungsten lamps will be supplied in 40 and 60 candlepower in the following ampere ranges: 4. 5.5 6.6 and 7.5 amperes. Forty candlepower is considered the minimum desirable candlepower for this class of illumination. Present 3.5 ampere systems can increase their current to 3.8 and 3.9, and thus come within the 4. ampere range. Further data and prices are given in Bulletin 4504, which will be sent on application.

SALES CONTRACTS—II.

Kinds of Sales Contracts.

B. A. Brennan.*

Contracts from the standpoint of sales, particularly those of machinery, are classified as:

Simple Sales Contracts;

Conditional Sales;

Bailments and Consignments.

Simple Sales Contracts.

Simple sales contracts are those simply covering the sale of machinery or product at a specific price and with agreed terms of payment.

A sales contract may be defined as a mutual assent by competent parties to the transfer of property for a determined consideration to be paid therefor.

A sale or bargin, when reduced to its simplest elements, is found to consist of a proposal or offer made on one side and accepted on the other. The proposal as made ought to be distinct and clear, and its acceptance should be correspondingly clear, full and unequivocal. If the acceptance falls short of the offer, or seeks to expand it, the negotiation may continue, but there is yet no mutual assent and no bargain. All bargains, to be complete, must be mutual and reciprocal; both parties must be bound; not one alone. A contract is always faulty from a practical sense, or that of easy consummation, which permits of diverse interpretations or does not stand out as an instrument specific in its terms and conveying no doubt as to the exact intention of the parties to it.

Price—In a sales contract, price is an element which must be determined, or is determinable. Immediate payment need not be made, but there must be an agreement to pay. In the absence of a fixed or specified price the law will imply a promise to pay as much as the property is reasonably worth.

Conditional Sales.

A conditional sale might be termed a sale under which the title and right of possession to the material or machinery sold shall remain in and be vested in the seller until the full purchase price shall have been made in cash, or until some other condition mentioned in the sale shall have been performed.

That there must be some condition to be performed before actual transfer of title, and that the condition must be complied with, or waived, before title passes, is well-established law, and the condition may be one to be performed either before or after delivery. This condition may be dependent for fulfillment either on the seller or user, and may refer to the articles which are contained in the contract or to the consideration to be paid therefor.

Machinery manufacturers or dealers in articles of manufacture have many occasions to make delivery of goods under contracts providing for future payment, and it is often desirable, from the standpoint of credit security, to retain the title to the machinery until payment has been fully made in cash. Dealers usually resort to contracts of conditional sale and sometimes bailment; however, almost invariably using indiscriminate and standard forms of contract without particular regard to the laws or statutory provisions of the particular States to which the material is delivered, or without regard to any procedure subsequent to the execution of the contract tending towards the preservation of the security intended to be given or derived under this feature of the agreement.

*"The Electric Journal."

In the consideration of such sales a great deal of discretion and discrimination is necessary, because, while as between the parties the validity of such sales is unquestioned, and in many States the rule applies in the same manner to third parties without notice or record, since in the absence of State laws or statutes requiring the filing or recording, the general rule is that the vendee (or customer) under a conditional sale obtains no title to the property before sale as would render the property subject to attack by his creditors, nor can he convey title to bona fide purchasers that can be enforced against the original seller. There are, however, many exceptions to this rule, and the laws of the different States are extremely varied in this respect.

In nearly every State all conditional sales are valid as between privy or direct parties; that is to say the customer and seller, without any record; but in many States all conditional sales, or sales where title is to depend upon any condition, must, to be valid as against third parties, be filed or recorded after procedure prescribed by statute. In each instance the filing or the recording of the terms of sale must be in the town or township where the vendee resides and the property is located, except in some few States where, if the customer is not a resident of the State, the filing or recording may be done where the vendor resides. In a few States the record shall not extend beyond one year unless it is renewed from time to time.

As to foreclosure or exercising vendor's rights under such contracts, few States have prescribed the mode of procedure. In some States the vendor may retake the property thirty (30) days after the condition is broken, while in other States the property is subject to redemption by the customer, unless otherwise stipulated in the contract.

The question has been asked whether a contract reserving title, with right of possession to the manufacturer, and where prior to shipment a trust deed to secure a bond issue was given stipulating that it covered all the property, both real and personal, which the customer then owns or may thereafter own, would prevail against the deed. On this question the authorities are not by any means harmonious. In Indiana, for instance, it does not seem that the Supreme Court has ever passed on the question directly, and there is no statute in said State which covers conditional sales or requires them to be executed or recorded in any particular manner. Such sales, however, have always been held valid by the courts of Indiana in a long line of decisions. These decisions are to the effect that where personal property is sold under a conditional sales contract, the title to remain in the vendor until payment in full of the purchase price has been made, that the title does not pass to the vendee until a full performance of the conditions, and neither he, nor his purchaser claiming under him, nor bona fide creditors can claim the property as against the rights of the seller; that a vendee in such conditional sales acquires no interest which is subject to lien and sale of third parties, and that such vendee can do nothing which will in any manner affect the rights of the vendor thereunder.

Such sales being thus recognized as valid against subsequent purchasers, the question next arises whether, considering the machinery in question personal property, it would pass under the previously executed trust deed or mortgage covering all of the property which the company owned at the time of the execution of the trust deed or might thereafter acquire. This has been passed upon in the United States courts and other courts. In one case a railroad company executed a mortgage, and bonds were issued thereunder. The mortgage covered all the property the railroad company then owned or possessed, or might thereafter acquire, either in law or in equity. Subsequently, a seller delivered to it under a conditional sales contract, a number of coal cars. The bond holders subsequently filed a bill to foreclose the mortgage, and it was claimed at the trial that the title to the cars had passed to the railroad company under a contract with the seller, and that subsequently the lien of the mortgage had attached to the cars as after-acquired property; but the court held that the mortgagor was not in any sense the purchaser of such property and had acquired no title. From this and the other authorities it is safe to say that if the machinery which it is proposed to sell under conditional sales reserving title, could be considered as loose property, susceptible of ownership and separate lien, that prior trust deeds or mortgages executed by the customer would not attach to the machinery, except in the nature and condition in which it is received by the seller; that is, subject to the prior rights of the seller under the contract.

It is held that if machinery sold under conditional sales becomes a fixture, it will become subject to the prior mortgage, and a difficulty arises in the question as to whether such machinery will become a fixture. The rule is that the determination of this question varies according to the relation and intention of the parties between whom it arises. By fixtures is meant such articles which in and by themselves, irrespective of annexation to land, are of a chattel or personal nature; but by reason of such annexation become a part of the land. The point of difficulty arises in determining whether such material has, by its installation, become a part of the irremovable fixtures. It has been said in many cases that the true criterion used by the authorities in the united application of several tests, as follows:

1st—The intention of the parties installing the machinery;

2nd—The use, adaptation or purpose of that part of the realty with which it is connected;

3rd—The real or constructive annexation of the articles in question to the realty.

There are many differences of opinion on the subject of conditional sales, in the decision of different jurisdiction and on the same question, but the weight of authority is in favor of the proposition that the title to the propery will be good as against prior or subsequent mortgages; but a wise precaution would be for the seller or vendor to place upon the machinery sold a name plate, indicating that the property is his. In all cases, however, it would seem expedient where mortgages already exist on the property on which the machinery is to be installed to obtain from the mortgagee a release or waiver so far as the machinery is concerned.

Clauses Reciting Reservation of Title.—In formulating contracts of conditional sale, a short clause reserving the title and as is used by many machinery manufacturers, reads:

"The title to the machinery or material furnished hereunder remains in the vendor until the full purchase price hereunder (including any modifications or extensions of payments, whether evidenced by notes or otherwise) shall have been fully paid in cash, and the vendee is to do all acts necessary to perfect and maintain such retention of title in the vendor."

Another clause is often used in contracts to follow immediately the suggested preceding one, the purpose of which is to define the intention of the respective parties to the contract with regard to whether or not the machinery shall retain its personal character. It reads:

"It is understood that the machinery hereunder shall retain its personal character and shall not become a fixture by being placed in any building or in any manner whatsoever annexed to any land. Further, if said machinery is placed upon mortgaged premises, it shall be without prejudice to the retention of title thereto in the vendor as herein provided."

Fire Insurance—It is considered that if title does not pass that some decision or distinction should be made as to the possible loss or damage to the machinery in case of fire, and the usual disposition of the question is covered by another clause, reading:

"Fire insurance in an amount sufficient to protect the interest of the vendor in the machinery or material sold is to be taken out and maintained by the vendee, and the policies of insurance are to be made payable to the vendor as his interest may appear at the time of loss. The vendee to assume all loss resulting from fire in the event of his not having effected such insurance."

Patent Clauses.

Customers frequently take the position that machinery or devices may be subject to patent litigation involving them in a suit or suits, and insist on a protecting clause in the contract, by which the seller agrees to save the customer harmless against damages resulting from the customer's use of the patented article. In agreeing to such an arrangement, care should be exercised in its wording, so that the seller may reserve to himself the conducting of the suits, and covering which the following is a suggested clause:

"We hereby agree to indemnify and save you harmless from and under any and all claims or suits for damages for infringement of any letters patent claimed by any person or persons relating to any part or portion of this machinery, provided you give us prompt and sufficient notice of said claim or suit and such information, assistance and power of attorney as may be necessary to answer to and defend such suits."

Terms of Payment.

In the recitation of the terms of payment the all-important consideration is that they be specific, as to the manufacturer a contract is always faulty which permits of diverse interpretation, and the greatest conceivable defect in expressing terms of payment would be to have them dependent upon the customer's mood, temperament and, perhaps, caprice. The employment of such expressions as "satisfactory operation," "when in successful operation," or, in fact, any contingency that would permit defining of terms contrary to the seller's intention or the spirit of the contract is dangerous, and oftentimes occasions delay in payment unwarrantably.

We are all familiar with the contract contingencies that delay the progress of the work. Other contractors may not have completed their work; the customer's plans may change, so that they are not in readiness for the machinery; and against all such possibilities the contract should stand as an instrument, specific in its terms and conveying no doubt as to the real intention of the parties at the time the contract was entered into. A way to most clearly define the intention in such cases would be to employ a clause, reading:

"If shipment, erection or starting of the machinery, or any part thereof, shall, when ready, be delayed on the vendee's account, it is understood that payment shall be due as though shipment had been made, erection completed and the machinery started."

Deferred Payments.—When deferred payments are agreed upon in contracts these sums should be evidenced by the customer's promissory notes, with interest at legal current rates, and it is advisable that such payment should date on shipment. A good way to express the arrangement would be in the use of a clause, next following the recitation of the terms, reading:

"The deferred portion of the purchase price shall be evidenced by the vendee's (.....) promissory notes, dated on shipment of the apparatus, and payable at the times hereinbefore mentioned, with interest at the rate of (.....) per cent. per annum."

It is also advisable, where the deferred portion of the price is to be divided into different amounts, to use the further stipulation that:

"Failure to pay any one note when due, makes all notes due at once."

as if default be made in any one payment suit could be brought for the whole amount without the necessity of awaiting the maturity of the others.

Notes.—A promissory note is a written promise to pay to a certain person, or to his order, or to bearer, at a certain time, a certain sum of money; and he who signs the notes is called the Maker or Promissor, and the other party is the Promissee or Payee.

Form of Note.—The form of note most generally used by machinery manufacturers is the following:

"Portland, Ore., May 1st, 1906.

"$1,000.00.

"Three months after date, I, John Doe, promise to pay to the order of John Brown one thousand dollars ($1,000.00), at his office in Chicago, Illinois, for value received, with interest at the rate of six per cent. (6%) per annum until paid. I also agree that if proceedings are commenced to collect this note by law, ten per cent. (10%) shall be allowed to include in the judgment thereon as attorney's fee. The Makers and Endorsers thereof each hereby waive presentation for payment, notice of non-payment and notice of protest of this note.

"(Signed) JOHN DOE."

There are, however, several points in connection with this form of note to which special attention is called.

Amount of Interest.—In most States the legal rate of interest has been established by statute; the rates varying considerably. In some States five per cent. is the legal rate; in others, six; in still others, seven and eight. Where no specific amount is stated in the note, or the note simply states "With Interest," it is the presumption that the note carries the legal rate of the State where the note is made payable. It is usual, however, to designate the rate of interest, but in so doing care must be taken so that the rate shall not exceed the limit prescribed by statute in that State. For instance, in Arkansas the legal rate is six per cent. and the limit by law, ten per cent., and there is a penalty for usury (which means more than the prescribed limit), of forfeiture of the entire interest. In Michigan the legal rate is five per cent. and the limit is seven per cent. with a penalty of all the interest for usury. In some States the excess is simply forfeited. In Oregon the entire principal and interest is forfeited to the school fund.

Agreement to Pay Attorney's Fee in Case of Default.—This can be enforced in some States; in others, not, with various contingencies affecting the note. In Minnesota such an agreement cannot be enforced, but it voids the negotiability of the note; in Maine it can be enforced, but does not void the negotiability of the note; in Maryland it can both be enforced and does not void the negotiability of the note.

These exactions are, however, purely statutory, and are subject to the particular State laws in which the notes are made, or made payable.

Maker's and Endorser's Waiver of Presentation, etc.—The provision in a note that

"The makers and endorsers thereof each hereby waive presentation for payment, notice of non-payment and notice of protest on this note"

adds materially to the facility of handling the note. It absolves the payee from the usual formalities of presentation, protest, etc.; also greatly expedites the matter of suit in case payment is not made at maturity.

Guarantee of Note.—It is usual to have notes endorsed; a good form being:

"For value received I hereby (or we hereby jointly and severally) guarantee payment at maturity of the within note."

Guarantee of Contract.—It is also quite common in contracts of sale to have the payments on the part of the vendee guaranteed by others not parties to the contract; sometimes on the contract itself; at other times by independent documents. If on the contract, the following clause is suggested:

"For value received I hereby (or, we, jointly and severally hereby) guarantee payment on the part of John Doe of the sums of money contracted to be paid by him in the within contract, and at the times and in the manner therein mentioned. This guarantee contemplates and covers any

and all modifications which may be made in said contract by the parties thereto."

If the guarantee be an independent instrument, the following may be used:

"Pittsburgh, Pa., Jan. 1st, 1907.

"For a valuable consideration, the receipt whereof is hereby acknowledged, I, John Brown (or, we hereby, jointly and severally), hereby guarantee payment by the purchaser of the amount specified in a certain contract between Jonas White & Company and Thomas Black, dated December 27th, 1906, all covering the furnishing of certain apparatus to the value of fifty thousand dollars ($50,000.00), in accordance with the terms and conditions recited therein.

"This guarantee contemplates and covers any modification which may hereafter be made in said contract by the parties thereto."

Application of Payments.—The question as to the application of part payments made by a debtor who owes several amounts to the same creditor is often raised, and three rules of application have been established by the courts:

1st—The debtor has the first right to say to which debt the payment shall be applied, and any creditor accepting the payment made, qualified as to its application, is bound to apply it as directed.

2nd—If payment is made without any directions expressed or implied, the creditor has the right to apply it to any debt due him from the debtor, but it must be a just debt and not disputed.

3rd—When neither party has elected on any specific application, the payment is presumed to apply to the oldest debt.

HOW THE NATIONAL FORESTS SERVE THE PUBLIC.

"The Use of the National Forests," a publication just printed by the Department of Agriculture, is a brief, clear manual for public information as to the forest policy of the national government.

It is too true, as the short preface to the public says, that "many people do not know what national forests are. Others may have heard much about them, but have no idea of their true purpose and use." It is the object of this publication to explain just what the national forests mean, what they are for, and how to use them.

In the first place, it is explained how the forests are created and how their boundaries are drawn. Next, their direct use and value are shown from the point of view of the homeseeker, the prospector and the miner, the user of timber, the user of the range, the user of water, and other users of forest resources. Third, it is shown how the forests are intended for use, for the production of usable products, and for the establishment and maintenance of homes; how on all of them the timber is protected from fire, the water flow is kept steady, the forage on the range is increased and guarded from abuse; and how, in addition, they serve as great public playgrounds and as breeding places and refuges for game. Finally, the management of the national forests is described.

Here it is that the great usefulness of the forests is brought out most clearly and strikingly, for the forests are managed by the people in their own interests, and every means is used to meet the desires and wants of all forest users half way by dealing with them in the main directly on the ground and in all cases with the utmost practicable dispatch and freedom from red tape.

In a word, the special interest of this manual lies in showing that the forest policy of the government, both in principle and in practice, is for the benefit of the ordinary man, for the benefit of every citizen equally. There is still a tendency to think of the national forests as "preserves" closed to use, and to leave the public lands exposed to unregulated individual exploitation. Where these misapprehensions still prevail "The Use of the National Forests" will go far to correct them.

The book is written by Mr. Frederick E. Olmsted, whose intimate knowledge of conditions in the West and the policy under which the national forests are managed especially fits him to deal with the subject.

THE COST OF PUMPING.

Steam, Gas and Electricity Compared.

At the recent Engineering Conference of the Institution of Civil Engineers, Chas. Hawksley and Henry Davey submitted a short communication in which they discussed the comparative cost of pumping by steam, internal combustion engines, and electricity, based upon actual working. They stated that in pumping operations two important questions were cost of fuel and continuous working. The best waterworks and mining engines gave one pump horsepower per hour with from twelve pounds to twenty pounds of steam. The comparison of the steam pumping engine with electric pumping plant, as regards fuel, was reduced to a question of the comparative mechanical efficiencies of the two systems, and the relative fuel economy in an example quoted was as ten to seventeen in favor of direct steam pumping. The cost of coal varied with the situation, but, generally speaking, in an ordinary steam pumping establishment it did not exceed five pounds to eight pounds per brake horsepower per annum, or less than one-quarter the cost of electricity at ½d. per unit. With gas engines of 200 horsepower the consumption of bituminous coal was stated at 1.75 pounds per horsepower, and while there would appear to be an economy in fuel alone in a gas engine over a steam engine for direct driving for pumping purposes, the mechanical loss in gearing between the engine and pumps would probably more than counterbalance the apparent saving. The authors stated that they knew of no oil engine plant which could successfully compete with steam pumping.

In the course of a discussion which followed the reading of the paper, Mr. Noble Anderson said that oil engines had made a great advance, the Diesel engine having been guaranteed, in the case of a pumping plant at Dunedin, at a consumption of 0.4 pound of oil per brake horsepower, which, taking the cost of oil at 55s. per ton, gave £5, 7s. 6d. per brake horsepower per annum. Mr. Dugald Clerk said that the total efficiencies of gas engine and pumps combined should be twenty-nine to thirty per cent., whereas the authors had assumed fourteen per cent., and Dr. Hopkinson said the consumption per brake horsepower was nearer 1.25 pounds than 1.75 pounds. Mr. L. Atkinson considered that the figures given in the paper were not quite fair to the electric drive. Mr. F. R. Phipps referred to experience with suction gas pumping plant, where, with anthracite costing 30s. per ton, 1.19 pounds were used per brake horsepower. In the case of an electrical pumping plant with which he was familiar, the cost was 2.3d. per brake horsepower. To compare with steam, the cost of current would have to be 0.45d. per unit. A subsequent speaker pointed out that a private generating plant could produce electricity at 0.2d. per unit, and that current could be got from supply companies at less than ½d. per unit. Mr. Binnie referred to a suction gas plant where the cost was £5, 8s. per brake horsepower per annum. Several speakers referred to the advantage of a centrifugal pump driven by an oil engine.

NEW AND UNIQUE ELECTRIC FURNACES.

By Frank C. Perkins.

In the accompanying illustration, Fig. 1, is shown one of the most interesting and successful types of electric furnaces used for metallurgical purposes as designed by Gustave Ginn, and utilized by the Societe des Procedes Ginn for electro-metallurgical purposes. It is stated that in the various types of apparatus devised up to the present time for producing electro-thermic reaction in molten pig iron, many difficulties have been encountered in utilizing the electric current in the bath. The resistivity of the bath seldom is more than twenty microms per cubic centimeter, and generally, it is held, the joule effect is produced in the layer of slag flating on the metal bath, using the notable higher resistivity of this slag.

It is also noted that it is difficult to obtain decarbonization, while using carbon electrodes, as the reduction of the

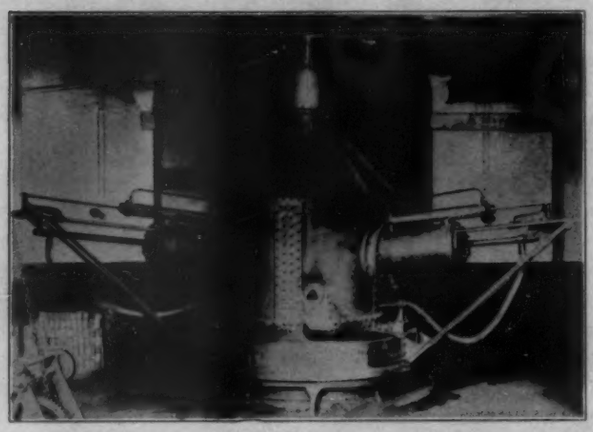


FIG. 1.—ELECTRIC FURNACE USED BY THE SOCIETE DES PROCEDES GINN

constituents of the slag is more readily effected by the carbon of the electrodes than by the combined or dissolved carbon in the baths.

It is well known that a number of furnaces have been designed where the current which passes through the bath is supplied by induction and without the use of electrodes, but it is maintained that this form of furnace heretofore has been found to be expensive, as it involved magnetic leakage to a considerable extent, thus interfering with the efficiency in utilizing electric power. In order to avoid these undesirable features, it is stated that an electric furnace was designed forming a trough or channel of considerable length and small cross section. By filling this trough with molten pig iron and having its terminal blocks of steel cooled by an internal current of water, most satisfactory results were obtained. The passage of the proper current in the conductor of fused metal developed a quantity of heat necessary to maintain the whole mass in fusion, and to bring it to the most favorable temperature for producing the refining reaction. The accompanying drawings show the details of construction of the Ginn electric furnace. The crude metal is treated with some iron ore and lime, so as to oxidize the impurities, while producing a basic slag which facilitates the elimination of the phosphorus. As soon as the purification is sufficient, scrap iron is introduced into the very hot bath, and the slag is removed when the fusion is complete. There are then final additions of ferro-manganese made, to reduce the oxide dissolved in the metal.

The use of this mixed process is dependent upon the nature of the possible supply of raw material, but it is maintained that it is especially adapted for those plants which can obtain scrap iron, bars, rail ends and sheets, at reasonable prices suitable for making proper mixtures. The Ginn furnace, it is held, will permit of easy manufacture of special steels by the direct incorporation of the additional element of manganese, nickel and tungsten, while special grades having a high manganese content and containing but very little carbon may be obtained by adding to the bath a suitable proportion of silicon manganese. The finished metal is poured from the electric furnace from the openings which are located in front of the furnace, opposite the electrical connections. The fused pig iron is introduced by funnels, and the furnace has a semi-circular bottom with a sinuous course.

The accompanying illustration, Fig. 2, and drawings, Figs. 3 to 5, show the details of construction, of method of operation, as well as the electrical connections of a new electric furnace installed at Turin, Italy, and operated by the Artillery Construction Works of the Italian War Office. The furnace was designed by Ernesto Stassano, director of the Forni Termoelettrici Stassano Co. The electric furnace

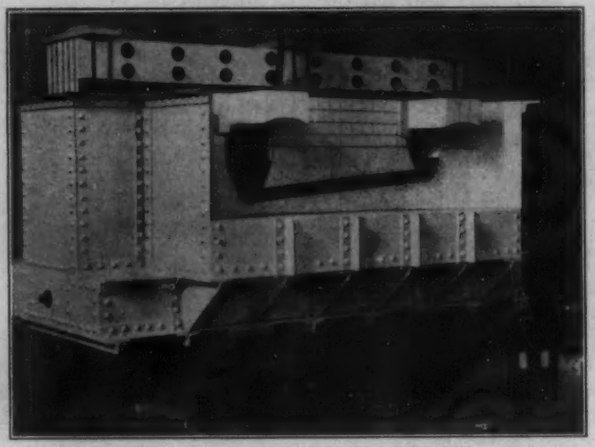


FIG. 2.—NEW ELECTRIC FURNACE AT TURIN, ITALY

installed at Turin absorbs 140 kilowatts of electrical energy between the electrodes, a rotary current being employed with 80 volts pressure between each phase. This electric furnace is employed for refining pig iron and melting scrap, and is charged with 200 kilograms of pig-iron turnings, together with sufficient ore to supply what oxygen is necessary for removing the impurities of the pig iron; also a proper proportion of lime for the slag, 200 to 300 kilograms of iron and steel scrap is employed, as well as some ferro-manganese and ferro-silicon in the proper proportions, to deoxidize the charge and to introduce the required amount of manganese.

Col. Corbetto, director of the War-office plant, gives the following interesting data: The "Stassano Rotary Electric Furnace," erected in the works of the Army Board, is capable of producing a good quality of shot steel by utilizing broken iron and steel and iron and steel turnings, such as produced by the ordinary working in military shops. The War Office has decided to work the furnace for the regular production of shot steel as the result of the report of delivery and tests of steel produced at this plant. The furnace installed is capable of producing "2,500 kilograms of steel every twenty-four hours, in four discharges, consuming for each discharge about 850 kilowatt hours of electric energy in the form of three-phase current at a potential of 80 volts between one phase and the next."

The steel produced by the Stassano electric furnace is steel to be used for artillery projectives, containing from 3% to 4% of carbon, about the same percentage of phosphorus, and from 1.2% to 1.5% of manganese. It is stated that high grades of steel other than the above may be easily

made with this electric furnace, either hard or soft grades being produced with equal facility.

The samples taken from the projectiles made as above mentioned by the electric furnace of Ernesto Stassano, have been tested as to tensile strength, and it was found that the breaking stress was 90 to 95 kilograms per square millimeters, which is from 57 to 60 tons per square inch. The percentage of expansion is said to have been from 12 to 14 on a length of 150 millimeters.

It is claimed that during the process of electric smelting the loss in weight is very little, while the consumption of the electrodes is less than 5 kilógrams per ton of steel. It is maintained that the consumption of electric energy is less than 1.3 kilowatt hours per kilogram of steel produced.

It is held that the refractory covering of the furnace will last about a month, while the cost of renewal is about 10 francs. The electric furnaces of the Stassano design are of both rotary and fixed types, as noted in the accompanying illustrations, and the fixed electric furnaces for copper ores are said to have given excellent satisfaction.

As shown in the figures, the Stassano rotary electric furnace comprises a metal armour mantle of cylindrical shape, terminating at the top in a truncated cone, internally lined with fire-proof material, into which opens the melting

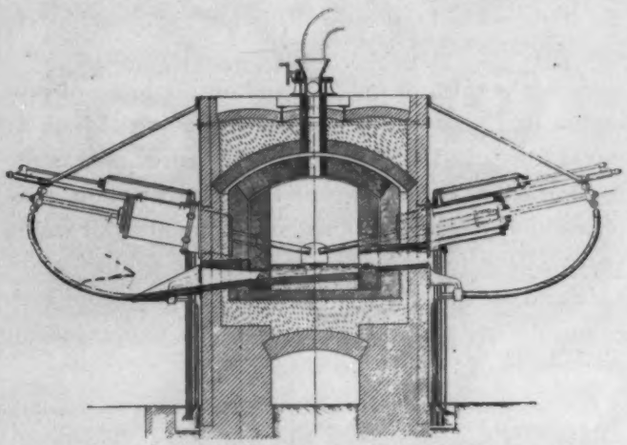


FIG. 3.—FIXED ELECTRIC FURNACE

chamber of circular cylindrical form terminating at the top in a cupola vault. There are in the refractory wall openings provided to give passage in the electrodes extending to the interior of the melting chamber meeting each other in the center.

It will be noted that the voltaic arc is thus produced at a convenient height above the bottom of the furnace. A current of water is caused to circulate in the double wall of the cylinders in which the carbons are placed, thus maintaining a comparatively low temperature in the coupling between the metallic part of the carbon holder and the electrode.

Connected above each of the cylinders is a hydraulic cylinder with a piston, the rod of which is located in the plane passing through the axis of the carbon-holding cylinder, and is connected to the end of the rod. There is a strong gear wheel connected below the base plane of the armour. By gearing with a shaft a rotary movement is given to the whole furnace. There are groups of brushes with a metallic support arranged at the center of the chamber below the furnace, bearing on rings and conducting current from the electric generators to the electrodes and forming a continuous contact, between the furnace electrodes and the source of electric current, whether the furnace is at rest or rotating.

The active agitation of the molten metal in this rotating furnace is of great value in favoring the chemical reactions which take place. The time necessary for these reactions to take place is greatly reduced, and the furnace may be worked under full load, obtaining the highest economy in utilizing the electric current.

It is claimed that the mixed electric furnace of the

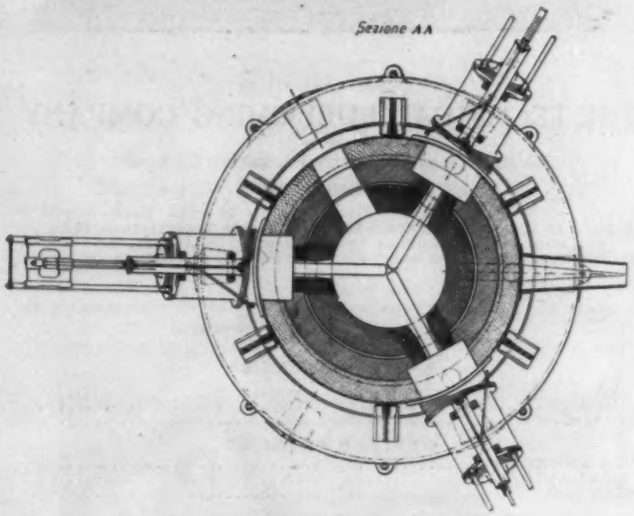


FIG. 4.—ROTARY ELECTRIC FURNACE

Stassano type is so designed that the molten material in the upper part of the bottom, which is the hottest part, may remain for a long time in the subsequent decantation chamber, allowing of complete separation of the cinder from the matt, or useful part, in the case of the copper. It is necessary in the treatment of copper ores to keep the

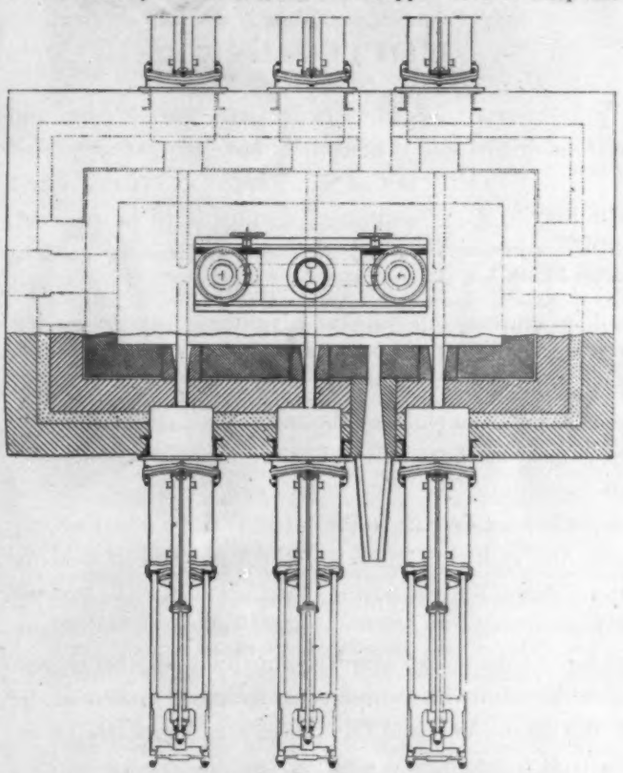


FIG. 5.—FIXED ELECTRIC FURNACE

material in a molten condition for a long time, in order to allow the metallic part to separate by density from the cinder. It is claimed that the electric process is far superior to the ordinary coal processes, and the electric furnace can be utilized to advantage for all metallurgical purposes.

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EDITORIAL.

THE HOPE OF THE OPEN SHOP.

Industrial freedom henceforth should be the watchword of every honest, intelligent, patriotic citizen of San Francisco. If this city's boundless destiny is to be realized, if our own and succeeding generations are to profit by the incomparable resources and natural advantages of the Golden Gate and the Pacific, the vital and basic principle of both American citizenship and industrial peace and prosperity—the right of the individual, under the law, to employ or be employed, how, when and where he chooses—must be recognized and absorbed, and if needs be, fought for, to the bitter end.

In the righteous contests which have been won by the United Railroads, the Pacific States Telephone Company, the Western Union Telegraph Company and the Postal Telegraph Company with the respective unions of their employees, we have witnessed the first signal victory for the theory and practice of industrial freedom, and believe that the best citizenship of San Francisco is thoroughly in accord with the heads of these corporations in this championship of the "Open Shop."

The right of men to pursue their trades or vocations without dependence upon, and the dictation of, labor unions hitherto has been spurned and trampled under foot in San Francisco. In many of the strikes which have interfered with the industrial progress of this city, and have molested the peace of our citizens, the most shameful disorder and brutal violence have obtained. The four public service companies above mentioned were not to be deterred from their course of duty and their obligation both to the public and their stockholders, either by the impudent prohibitions of organized labor or by outbreaks of violence for which the unions must accept the responsibility.

It is easy to show that the interests of San Francisco, and of transportation, telephone and telegraph companies, indeed of any public utility, are identical and parallel. What was San Francisco's appalling disaster fifteen months ago was also the greatest calamity that could be visited upon all these companies. It was the aftermath of that disaster which tried the souls not only of individuals but the stockholders and directors of these companies. Those of us who were in the thick of the fray and on the brink of ruin realize that no other factors were so essential both as moral forces and as practical conveniences as was the restoration of the service of the transportation, telephone and telegraph companies. Some of us, it would appear, have forgotten the incalculable debt of gratitude that we owe the managers and employers of such companies for the marvelously prompt and expedient restoration of these industries.

Extraordinary conditions demand extraordinary action. If San Francisco had continued consistently to follow out the work as it was begun before the ruins had cooled off, had maintained the same spirit of united co-operative action, if honesty in its highest sense had been a part of the work of all, instead of graft and robbery, conditions would not be so serious to-day—more than a year since the disaster. Industrial strife, unjustified increase in the cost of materials of construction, a corrupt and rotten administration in control of the city—all this has the city survived, and to-day the outlook is bright. We have, since our last issue, had a Mayor selected and put into office who has received the endorsement of every sensible, honest, well disposed citizen of San Francisco. We are on the new trail, we are started in the right path, and it is of the utmost importance that every one of every class and condition put his shoulder to the wheel and assist in every possible way to raise San Francisco to the position it justly should have as the metropolis of the Pacific Coast.

The new Mayor has our whole support, but we can-

not but feel that the part that the public service corporations have played in the last fifteen months' history of San Francisco is such that under no conditions must the ground gained be relinquished, no matter what may come to pass. The unqualified championship of the "Open Shop" on every hand has proved of incalculable advantage to organized labor and capital alike. The standard of the "Open Shop" has been raised and future administrations of San Franciso must see to it that it is never lowered as the future peace and prosperity of the city depend mainly on maintaining that standard in its right and lawful places.

FIRE-KILLED TIMBER FOR RAILROAD TIES.

A recent circular of the United States forest service states that it is not generally known that trees killed by forest fires are used to any large extent, the popular opinion being that timber of this character is unfit for use. Dead timber is usually associated with unsound and decayed wood. In the West, however, there are many large tracts of fire-killed timber which, owing to dry climate and high elevations, are just as sound thirty years after as the day they were burned.

One of the important uses made of dead timber is for railroad ties. It has been found that the strength of the timber has not been impaired by the fire-killing, while the durability has been often increased. Where these ties have been used along with green timber ties, they have shown remarkably well. In some cases they have lasted much longer than ties of green timber.

Dead timber is used for this purpose in wholesale quantities in the Pike's Peak national forest, in Colorado, and in a more limited way in some other places. That ties made of this material are of known value is proved by the fact that the price is the same as for green timber ties. In quite a few places these ties have been made as long ago as fifteen years. Where the ties are known there is a strong demand for them. One tie contractor had a contract for 75,000, and could easily have doubled it had he been able to get out the ties. The Government, through the forest service, is acting for the greatest economy by disposing of this dead tie material before it becomes useless, as every dead tie that is sold saves that much green timber to keep up the future supply.

TRADE CATALOGUES.

Westinghouse incandescent lamps for all candlepowers, voltages and efficiencies are illustrated and described in a handsome catalogue from the Westinghouse Electric & Mfg. Co., Pittsburg, Pa.

Bulletin No. 4504 from the General Electric Co., Schenectady, N. Y., shows the application of the General Electric tungsten lamp, for street series lighting. No. 4517 presents switchboard panels with fuses for small continuous-current installation where circuit breakers are not necessary.

The Chase-Shawmut Company has issued an attractive 58-page booklet, pocket size, covering its complete line of fuses, bases and fittings. In addition to their regular line, this catalogue presents a number of specialties which have recently been placed upon the market.

Nash gas and gasoline engines for electric lighting, pumping, fire protection and general power purposes, are shown by the catalogue of the National Meter Co., 84 Chambers Street, New York City. The first part cites examples of their use; the second mentions some of the leading features of their design and construction.

The General Electric Co., Schenectady, New York, has issued a beautiful brochure on Electric Heating and Cooking. It is illustrated in colors, and gives a most favorable impression of the advantages of keeping house with an electric motor. It contains a valuable foreword to central-station men, and some matters of interest to architects and electrical contractors.

PERSONAL.

C. L. Cory is at Salt Lake City, Utah.

L. J. Corbett has offices as consulting electrical engineer, at 501 Empire State Building, Spokane, Wash.

Mr. Alexander J. Rosborough, manager of the Yreka Power Company, was in Oakland last week on a business trip.

G. C. Robb, formerly Pacific Coast engineer for the Stanley-G. I. Electric Mfg. Co., is with the Sacramento River Supply Co., Sacramento, California.

C. S. Davidson, head of the land department of the California Gas and Electric Company, is spending his four-weeks' vacation in a hunting and fishing trip through the northern part of the State.

Fresno.—It is learned that H. E. Huntington is to spend $3,000,000 on a modern electric railroad between Fresno, Cal., and the Yosemite. Surveys by way of Crane Valley, a distance of ninety-six miles, are complete. His project, combined with the new electric extension of the Central California Traction Company, between Stockton and Sacramento, via Lodi, is attracting considerable attention in railroad circles. He intends having a big system with Fresno as the center. His San Joaquin Power Company will furnish the necessary motive power. The completion of the survey to Yosemite Park marks the close of the preliminary stage of the mountain electric line. The financing of the project is to be done by Huntington's Los Angeles office. From the survey, which follows the line of least resistance, it has been possible to form a close estimate of the minimum cost of construction. It was commenced last September and has been carried on under the personal direction of Emil Newman. The first and most difficult part was from Wawona to the Crane Valley. By the completion of the new road W. J. Barnett, J. Dalzel Brown, the Fleishackers and their associates in the Central California Traction Company will have ultimately 250 miles of electric road in and around Stockton. The line now building to Lodi will finally reach Sacramento. There it will connect with the Henry A. Butters electric system, running down from Oroville, Marysville, Chico and Red Bluff. In view of this, traffic by electric road from the head of the San Joaquin Valley at Stockton up the great Sacramento Valley as far as Red Bluff will shortly be possible. Samuel M. McLenegan, formerly of the Huntington system in Los Angeles, has been appointed general manager of the new traction company.

LOCAL STOCKS AND BONDS

Furnished by Courtesy San Francisco Stock and Bond Exchange.

Outstanding	INTEREST	MISCELLANEOUS BONDS.	JULY 12		JULY 13		JULY 15		JULY 16		JULY 17		JULY 18	
			Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked
1,532,000	F & A	Associated Oil Co. 5%	79	.....	79	.....	79	.....	79	.....	79	.....	80	.....
2,250,000	M & S	Bay Counties Power Co. 5%	.....	99	.....	99	.....	99	.....	99	.....	99	.....	99
1,000,000	F & A	Cal. Central Gas & El. 5%	.....	103	.....	103	.....	103	.....	103	.....	103	.....	103
9,600,000	M & S	Cal. Gas & El. Gen. M. & C. T. 5%	77½	79	77½	79	.....	79	77¼	.....	77	80	77	78
900,000	J & J	California St. Cable Co. 5%	98	101	98	101	98	101	98	101	98	101	98	101
2,000,000	J & J	Contra Costa Water Co. 5%	100	.....	100	.....	.....	102	100¾	.....	100	101	100	101
1,000,000	J & J	do do Gen. Mtg. 5%	.....	97½	.....	97½	.....	97	.....	97	.....	97	.....	97
623,000	F M A N	Edison Light & Power 6%	.....	115	.....	115	.....	115	.....	115	.....	115	.....	115
650,000	M & S	Ferries & Cliff Ho. Ry. 6%	102½	.....	102½	.....	103	.....	103	.....	103	.....	103	.....
671,000	A & O	Geary St. Ry. 5%	52	.....	52	.....	52	.....	52	.....	52	.....	52	.....
610,000	M & N	Honolulu R. T. & L. Co. 6%	105½	.....	105½	.....	105½	.....	105½	.....	105½	.....	105½	.....
300,000	A & O	Lake Tahoe Ry. & T. Co. 5%	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
500,000	J & J	Los Angeles Elec. Co. 5%	.....	100	.....	100	.....	100	.....	100	.....	100	.....	100
1,300,000	J & J	Los Angeles Gas & Elec. Co. 5%	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5,000,000	A & O	Los Angeles Ry. 5%	108½	.....	108½	.....	108	.....	109	.....	109	.....	109	.....
1,000,000	A & O	Los Angeles Lighting Gd. 5%	.....	105	.....	105	.....	105	.....	105	.....	105	.....	105
1,500,000	A & O	Los Angeles Pac. R. R., 1st Con. Mtg. 5%	102¾	103½	102¾	103	102½	103½	102¾	103½	102¾	103½	102¾	.....
3,030,000	M & S	L. A. Pac. R. R. of Cal. 5%	.....	102	.....	102	.....	100	.....	100	.....	100	.....	100
3,000,000	J & J	Market Street Cab'e 6%	108	.....	108	.....	108	.....	108	.....	108	.....	108	.....
5,141,000	M & S	do Ry., 1st Cons. Mtg. 5%	101½	.....	101½	.....	101½	.....	102	.....	102	.....	102	.....
100,000	A & O	Mill Valley & Mt. Tamalpais S. Ry. 5%	103	.....	103	.....	103	.....	103	.....	103	.....	103	.....
4,751,000	A & O	Northern Ry. Co. of (Cal.) 5%	112	113	111½	.....	111½	.....	111½	.....	111½	.....	112	.....
1,498,000	J & J	North Pacific Coast R. R. 5%	99	102½	99	.....	99	.....	100	.....	100	.....	100	.....
1,074,000	J & D	Northern Cal. Railway 5%	.....	105	.....	105	.....	105	.....	105	.....	105	.....	105
980,000	J & D	Northern Cal. Power Co. 5%	97½	99	97½	99	.....	99	.....	99	97½	99	.....	99
6,000,000	A & O	Northern Electric Co. 5%	.....	97½	.....	97½	.....	97½	.....	97½	.....	97½	.....	97½
1,000,000	M & S	Oakland Gas Light and H. 5%	100	105	100	.....	100	.....	100	.....	100	105	100	.....
1,374,000	J & J	Oakland Transit Co. 6%	108½	109½	108½	109½	108½	108¾	108¼	.....	108½	.....	108¼	.....
1,600,000	J & J	Oakland Transit 5%	101¼	.....	102	.....	102	.....	101½	.....	102½	.....	102½	.....
1,326,000	J & J	Oakland Transit Con. 5%	100	.....	100	.....	100	.....	100	.....	100	.....	100	.....
7,000,000	J & J	Oakland Traction Con. 5%	.....	100	.....	.....	.....	99	.....	99	.....	99	.....	99
1,500,000	J & J	Oakland Water Co. gtd. 5%	.....	97½	.....	97½	.....	98	.....	98	.....	98	.....	98
2,000,000	A & O	Omnibus Cable Ry. 6%	108½	112	108½	112	108½	112	108½	112	108½	112	108½	112
1,149,000	S D M J	Pacific Gas Imp. 4%	.....	92½	.....	92½	.....	92½	.....	92½	.....	92½	.....	92½
8,494,000	J & J	Pacific Electric Ry. Co. 5%	101	.....	101	.....	101	.....	101	.....	101¼	.....	101½	102¼
4,491,000	J & J	Pacific Light & Power Co. 5%	.....	100¼	.....	100¼	.....	100¼	.....	100¼	.....	100¼	.....	100¼
3,000,000	J & J	Pacific Tel. & Tel. Co. 5%	.....	103	.....	103	.....	103	.....	103	.....	103	.....	103
350,000	J & J	Park & Cliff House Ry. 6%	101	102½	101	102½	101	102½	101	102½	101	102½	101	102½
250,000	J & J	Park & Ocean R. R. 6%	102	.....	102	.....	102	.....	102	.....	102	.....	102	.....
700,000	M & S	Powell Street Railway 6%	.....	107½	.....	107½	.....	107½	.....	107½	.....	107½	.....	107½
2,500,000	M & N	Sacramento Elec. Gas & Ry. 5%	97½	.....	97½	.....	97½	.....	97½	.....	97½	.....	97½	.....
6,000,000	A & O	S. F. & S. J. Valley Ry. 5%	112	115	112½	113½	112½	.....	112	113	112½	113½	112½	113½
3,000,000	J & J	S. F., Oak. & San Jose Ry. 5%	101½	.....	101¾	.....	102	.....	102	105	102	.....	102	.....
1,500,000	J & J	do do 2d Mtg. 5%	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1,500,000	A & O	S. J. & S. Clara Co. R. R. 4½%	.....	95	.....	95	.....	95	.....	95	.....	95	.....	95
642,000	A & O	Sierra Ry. of Cal. 6%	.....	109	.....	109	.....	109	.....	109	.....	109	.....	109
6,000,000	J & J	S. P. R. R. of Arizona 6% (1909)	101	.....	101	.....	100¾	.....	100¾	.....	101	.....	101	.....
4,000,000	J & J	do do do (1910)	.....	.....	101½	.....	101½	102	101½	102	101½	102	101½	.....
5,116,000	A & O	S. P. R. R. of Cal. 6% (1912)	.....	110	.....	110	.....	110	.....	110	.....	110	107	.....
4,127,500	M & N	S. P. R. R. of. Cal., 1st c. gtd. 5%	114	117	114	117	114	117	114	117	114	117	114	117
3,533,000	A & O	S. P. Branch Ry. of Cal., 6%	123	125½	123½	125	123	.....	123	.....	123	.....	123½	128
81,178,000	J & J	S. P. R. R. Co., 1st Ref'd'g. 4%	91	91⅜	91	91⅜	91	91⅜	91¼	.....	91⅜	92¼	91	92
17,500,000	J & D	Spring Valley Water Co. Gen. Mtg. 4%	84¼	85	84¼	85	84¼	85	84¼	85	84¼	85	84¼	85
300,000	M & S	Stockton Gas & Elec. Co. 6%	100	.....	100	.....	100	.....	100	.....	100	.....	100	.....
2,000,000	J & J	United Gas & Elec. Co. 5%	.....	100	.....	100	.....	100	.....	100	.....	100	.....	100
20,000,000	A & O	United R. R. of S. F. 4%	.....	.....	71½	72	71½	71¾	71¾	72	71½	72	71½	72
2,500,000	M & N	Valleys Counties Power Co. 5%	.....	100	.....	100	.....	100	.....	100	.....	100	.....	100
		Water Stocks.												
.....	.....	Contra Costa	.....	62	.....	62	.....	62	.....	62	.....	62	.....	62
6,000	Quarterly	Marin County	.....	62	.....	62	.....	62	.....	62	.....	62	.....	62
280,000	.....	Spring Valley Water Co.	20¼	20⅝	20¼	20⅓	20	20½	20⅛	20⅜	20	20½	20	20⅛
		Gas and Electric Stocks.												
37,500	.....	Martel Power Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9,340	.....	Mutual Electric Light Co. (Ctfs.)	4½	.....	4½	.....	4½	.....	4½	.....	4½	.....	4½	.....
37,336	.....	do (Extended Ctfs.)	12⅞	.....	12⅞	.....	12⅞	.....	12⅞	.....	12⅞	.....	12⅞	.....
40,000	Monthly	Pacific Lighting Co.	60	70	60	70	.....	70	.....	65	.....	70	.....	65
12,000	.....	Stockton Gas & Elec. Co.	52	.....	52	.....	52	.....	52	.....	52	.....	52	.....
		Street Railroad Stocks.												
10,000	.....	California	.....	140	.....	140	.....	140	.....	140	.....	140	.....	140
10,000	.....	Geary	.....	41	.....	41	.....	41	.....	41	.....	41	.....	41
10,000	.....	Presidio	.....	25	.....	25	.....	25	.....	25	.....	25	.....	25
	Semi-an.	Associated Oil Co.	28	30	28	29	28	.....	26	27	26¼	27	27½	28
1,625	Quarterly	Mill Valley & Mt. Tamalpais S. Ry.	.....	110	.....	110	.....	110	.....	110	.....	110	.....	110
180,000	Quarterly	Pac. Tel. & Tel. Co. (Pfd.)	.....	95	.....	95	.....	95	.....	95	.....	95	.....	95
180,000	.....	Pac. Tel. & Tel. Co. (Common)	.....	15	.....	15	.....	15	.....	15	7	15	7	15

Unlisted Securities

750,000	A & O	Bay Counties Power Co. 6%	.....	103½	.....	103½	.....	103½	.....	103½	.....	103½	.....	103½
745,000	M & S	Blue Lakes Water Co. 6%	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2,000,000	A & O	California Northwestern Ry. 5%	.....	108	.....	108	.....	108	.....	108	.....	108	.....	108
160,000	J A J O	Marin County Water 5%	.....	100	.....	100	.....	100	.....	100	.....	100	.....	100
600,000	J & J	Risdon Iron Works 5%	.....	100	.....	100	.....	100	.....	100	.....	100	.....	100
500,000	M & S	S. F. Dry Dock 5%	.....	109	.....	109	.....	109	.....	109	.....	109	.....	109
8,000,000	M & N	S. F. Gas & Electric 4½%	.....	95	.....	95	.....	95	.....	95	.....	95	.....	95
3,926,000	J & J	S. F. & North Pacific Ry. 5%	100	105	100	105	100	105	.....	105	.....	105	100	104½
5,500,000	J & J	South Pacific Coast Ry. 4%	.....	95	.....	95	.....	95	.....	95	.....	95	.....	95
.....	.....	Standard Electric Co. 5%	.....	92½	.....	92½	.....	92½	.....	92½	.....	92½	.....	92½
.....	.....	do do Gtd. 5%	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
750,000	J & J	Sunset Tel. & Tel. Co. 6%	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2,250,000	A & O	Sunset Tel. & Tel. Co. 5%	.....	105¼	.....	105¼	.....	105¼	.....	105¼	.....	105¼	.....	105¼
1,000,000	M & N	Sutter Street Railway 5%	.....	105	.....	105	.....	105	.....	105	.....	105	.....	105
		Stocks.												
50,000	Monthly	Gas Consumers' Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
100,000	Monthly	Northern Cal. Power Co.	23	25½	22½	25	22½	25	22½	25	22½	25	22½	25
.....	.....	Pac. Gas & Elec. (Pfd.)	.....	40	.....	40	.....	40	.....	40	20	40	30	40
.....	.....	Santa Cruz Port. Cement	.....	50	.....	50	.....	50	.....	50	45	50	50	.....
.....	.....	Standard Port. Cement (New)	.....	55	.....	55	.....	55	.....	55	.....	55	.....	55
50,000	Monthly	Truckee Electric Co.	14½	.....	14½	.....	15	.....	14¾	.....	14¾	.....	14½	15

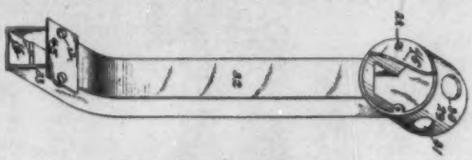
PATENTS

Electric, Gas and Water.

Specially reported for the Journal of Electricity, Power and Gas.

HOUSE-WIRING CONDUIT SYSTEM. 858,846. Harry Alexander, New York, N. Y.

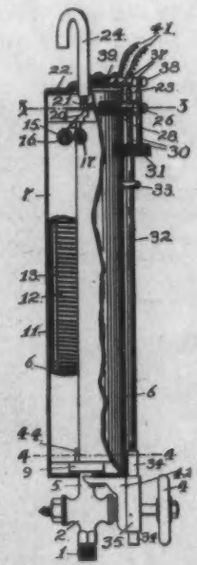
A conduit system permanently located in a building; system comprising a plurality of intercommunicating conduits embedded in a partition of a compartment, extending in various directions, and being readily accessible from the surface of the partition at any locality throughout the extent of



system; each conduit being located approximately along the locus of the probable locality for an outlet; system providing for the introduction therein of the work, for which it is intended, at any locality throughout its extent, and also providing for the extension of work therein to any second locality throughout its extent, at which second locality an exit of the work may readily be made.

INSTANTANEOUS ELECTRIC WATER-HEATER. 858,351. Herbert N. Roche and Fred F. Breese, San Francisco, Cal.

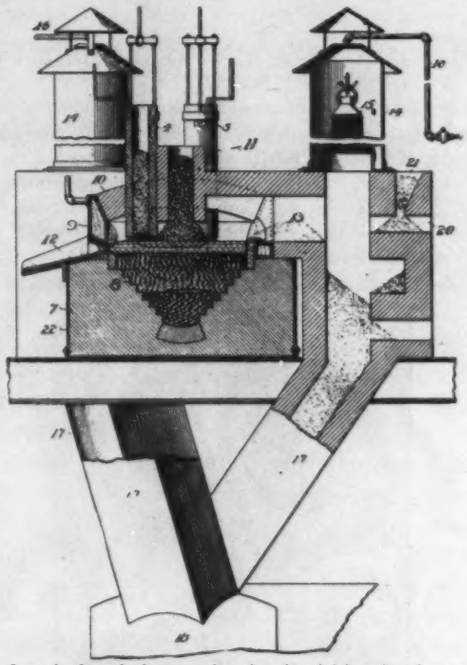
The combination of a casing, a plurality of heating tubes therein, a lining of insulating material on the inside of each tube, a tube of non-conducting material within each tube, a coil of high resistance wire within the inner tube,



wire being continued in a coil on the outside of the tube, a rod of non-conducting material within the inner coil, means for connecting the ends of the coils of the several tubes in series, means for connecting the ends of the series thus formed with an electric circuit, means for admitting water in succession through the outer tubes, and an operative connection between said means whereby they act in unison.

ELECTRIC FURNACE. 859,136. Frederick T. Snyder, Oak Park, Ill., assignor to Electric Metal Co., Chicago, Ill.

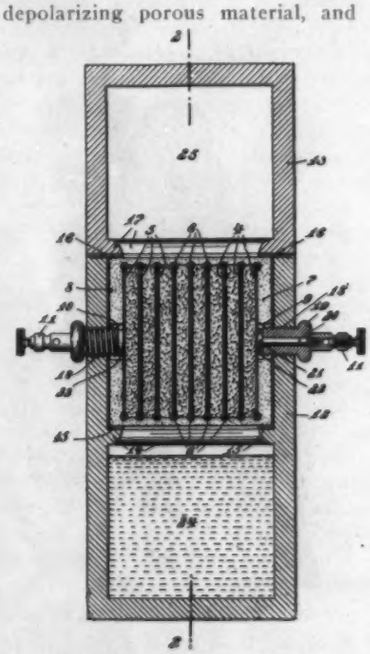
An electric furnace comprising a base portion of refractory material, a double wall of metal surmounting base, means for maintaining a flow of cooling fluid within double wall, a



bath of fused slag being maintained within the furnace, slag being congealed upon the inside of the furnace wall to form a lining therefor, and means for passing electric current between different points in bath, lining of congealed slag serving to electrically insulate metal walls and also to conserve the heat.

PRIMARY BATTERY. 858,392. Charles E. Hite, Burlington, N. J., assignor to Hite Electric Company, a corporation of Delaware.

The combination of a plurality of pairs of electrodes packed in depolarizing porous material, and incased in a



coating of porous material adapted, when hard, to form the elements into a solid block, means for making connection with the terminal electrodes and means for passing by percolation an electrolyte through electrode block.

INDUSTRIAL

THE FLEXIPHONE—A NEW TELEPHONE INSTRUMENT.

A new telephone instrument, which is briefly described and illustrated in the following lines, has recently been developed and placed upon the market by the Holtzer-Cabot Electric Company, of Brookline, Mass., in conjunction with the Oliver Manufacturing Company of Philadelphia. This instrument, called the flexiphone, takes the place of wall and desk telephones and is being adopted by a large number of telephone exchanges as the instrument which they recommend for office and house use.

FIG. 1.—FLEXIPHONE MOUNTED ON FLAT-TOP DESK

In general, the flexiphone is a combination of the best and most essential features of a desk telephone instrument and an adjustable telephone arm. It solves the desk telephone problem, because it is always where you want it, when you want it, and is never in the way when you do not want it. Important papers are not disturbed nor inkwells upset, neither do telephone cords get tangled when the flexiphone is used. It is self-balancing in any position, the tension of the springs in the arm being just sufficient to counterbalance the weight. This feature will be much appreciated as it leaves one hand free for making notes, etc.

FIG. 2—FLEXIPHONE PEDESTAL TAKEN APART

The flexiphone may be fastened to a flat or roll-top desk or to the wall, or mounted on a floor stand, and may be used equally well by persons of different heights, whether in a sitting or standing position. If desired, it may be arranged to serve two desks. The telephone cords are secured to the arm and therefore never become twisted or kinked.

In detail, the salient points may be briefly outlined as follows, the pedestal and arm being treated separately:

The construction of the pedestal is unique and quite a departure from former types, the main feature being the accessibility of all the various parts and connections. By removing a small screw in the center of the pedestal, the set can be readily taken apart and the outer casing removed, exposing the mechanism as shown in Fig. 2. The operating parts may be replaced in skeleton form without the casing, thus permitting a full view of the movement and allowing ready access for adjustment. This is well illustrated in Fig. 3. All connections are brought out to terminals fitted into a hard rubber block which is securely fastened to the base of the pedestal frame. Hard rubber is used exclusively for insulating and pure platinum for all contact points. The

FIG. 3.—PEDESTAL REPLACED IN SKELETON FORM

FIG. 4.—THE FLEXIPHONE IN THE HOME

contact springs are of German silver and rest against stops under tension. There are no unsoldered connections between the desk terminals and the transmitter, a point which will be instantly appreciated. The hook switch acts directly upon the contact springs in the pedestal, thus doing away with all levers and lost motion. An auxiliary steel spring supports the weight of the hook, allowing the full elasticity of the contact springs to be used in making and breaking contacts.

The pedestal is made of heavy seamless tubing with an outer shell of hard rubber. It is mounted in such a way that it always remains vertical throughout all the movements of the arm. The transmitter mouthpiece is secured at a convenient angle and the transmitter head is mounted on a swivel, which makes nearly a complete revolution in a horizontal plane. This, together with the vertical and swinging movement of the arm, gives practically any desired adjustment to the flexiphone.

The instrument is wired for common battery, series or bridging magneto circuits, as desired. It is well adapted for home use as shown in Fig. 4, where the instrument is secured to the pedestal of the mantel. This illustration also shows the ease with which a child may use the 'phone in a sitting position, there being no bulky instrument to hold in the hand.

The finish of the exposed metal surfaces of the pedestal and transmitter is polished nickel and the arm may be furnished either in a combination of nickel and hard rubber finish or in full nickel, as preferred.

Descriptive printed matter on the flexiphone will be gladly mailed by the Holtzer-Cabot Electric Company to interested parties on receipt of request.

ELECTRICAL EQUIPMENT IN A NORTHWESTERN PAPER MILL.

The Willamette Pulp & Paper Co., of Oregon City, Oregon, has added to its plant a second factory, which, with the older mill, enables the company to produce 140 tons of newspaper per day. The complete plant of the Willamette Pulp & Paper Company is one of the largest of the kind on the Pacific Coast and supplies paper for the principal daily newspapers of the Northwest.

The new mill, being for the most part electrically driven, furnishes an excellent example of the advantages of this flexible method of power distribution. The Willamette River at this place has a fall of twenty-five feet and the old mill of the company is located at the brink of the falls. The new mill is one thousand feet distant and is driven by induction motors supplied with current from a water-wheel-driven generator in the old mill. By utilizing the electric system in this way, it has been possible to develop some seven hundred and fifty additional horsepower at the falls and at the same time place the mill advantageously.

The electrical equipment was furnished by the General Electric Company and consists of a 600-kilowatt, 3-phase, 600-volt, revolving-field, alternating-current generator direct connected to a 1000-horsepower water-wheel built by the Platt Iron Works. The power is transmitted directly at the generator voltage.

To insure against a shutdown in the new mill, arrangements have been made with the local company for power, should any accident happen to the paper company's generating equipment.

In the new mill both group and individual induction motor drives have been arranged. The motors are all of the squirrel-cage type and operate at 550 volts. One group consists of a 12x12-inch chipper, a chip separator, a sawdust conveyor and a bucket-hoist, driven by a 200-horsepower induction motor. The motor is operated eight hours per day and carries load easily no matter how hard the chipper is crowded. The bucket-hoist carries the chips into bins ready for the digester.

A second group driven by a 200-horsepower induction motor consists of three pumps and four beaters, each handling 650 pounds of pulp. This motor runs continuously twenty-four hours per day. The beater load fluctuates greatly, varying with the amount of moisture in the pulp and the amount of pressure exerted by the operation. Owing to the large starting effort required for the beaters, a friction clutch is inserted in the line shaft so that the motor can come up to speed without load and then take the load gradually by means of the clutch.

A third induction motor, having a capacity of 100 horsepower, drives two chest-agitators and three pumps. The paper is reduced to the proper consistency for the paper machine in a Jordon engine, which is driven by a 100-horsepower motor.

A 10-horsepower motor is belted to the elevator. This motor runs continuously, taking full load only when the elevator is in use. The four wet machines and three Decker machines are also driven from a counter shaft belted to a 50-horsepower induction motor.

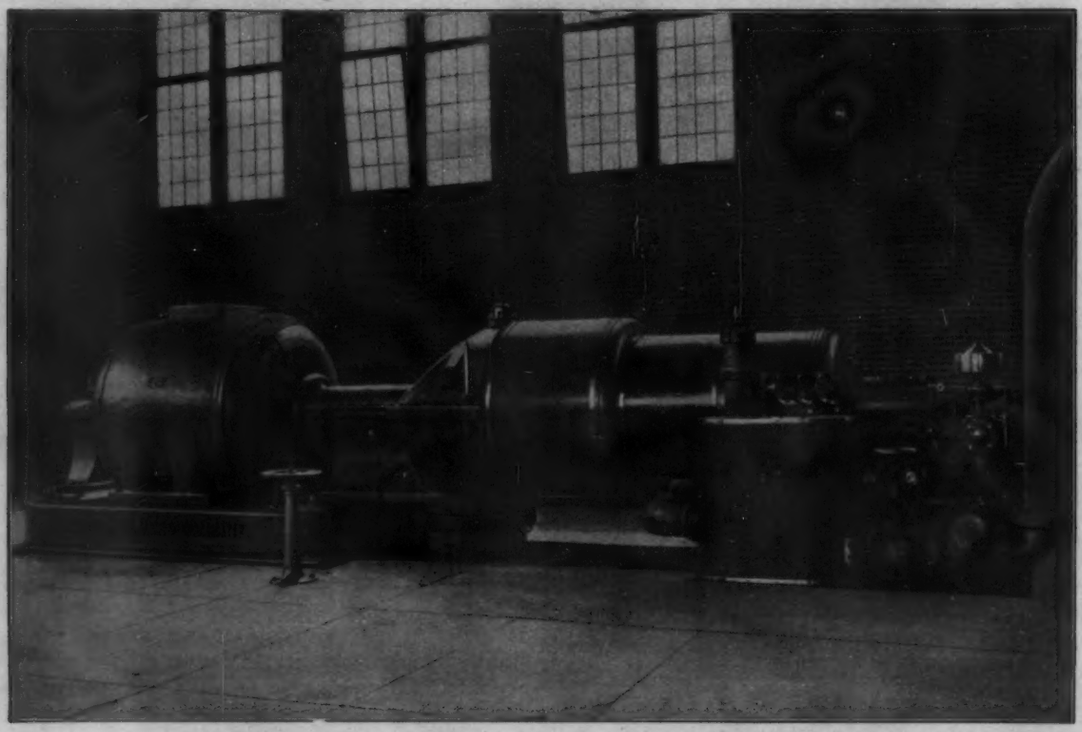
Steam power is used for the operation of the 152-inch Fourdrinier paper-making machine. A 650-horsepower non-condensing engine is used for this purpose, the exhaust steam being piped to the drying cylinders on which the paper is rolled before being calendered and reeled.

The introduction of the electric motor into modern methods of manufacturing has practically revolutionized many of our industries. The variety of uses to which the motor has already been put is one of the wonderful features of the present day's industrial operations, and yet its development appears to have only just begun. The absence of steam, dirt and smoke, the extensive elimination of the dangerous belt, as well as the greater economy of electric power over steam, are some of the causes which are making the ascendency of the "electric drive" so phenomenally rapid. So important has this work become that the larger electric companies have a special department, which takes care of the work of electric motor power production. Taking, for example, at random, some of the orders which the Westinghouse people have taken in this field since the first of June, the variety of the use of the motor becomes evident. The East Pittsburg works are now turning out sixteen locomotives for coal mines in West Virginia and Kentucky, one for an iron mine in Sweden, another for a power company in the State of Washington, and one for a plate glass mill at Charleroi, Pa. They are constructing a complete electric motor equipment for a phosphate mine in Florida, for a lumber camp at Mount Pleasant, Pa.; they have in hand an order for thirty-nine motors to drive machinery in a cash register manufacturing plant at Dayton, O.; they are turning out fifty-nine motors for driving textile looms at East in a worsted mill at Passaic, N. J. Fifteen motors are going to a paper mill in Canton, N. C., and twenty to a paper mill in Fulton, N. Y.

STEAM TURBINES AT PACIFIC MILLS AT LAWRENCE, MASS.

One of the fields of manufacturing service into which steam turbines have been successfully introduced is that of the textile industry, where the operation of this type of prime mover offers a number of advantages. In the erection of their new power plant at Lawrence, Mass., the Pacific Mills, which rank among the largest and best-known establishments of this character in the country, have had designed by Charles T. Main, mill engineer and architect of Boston, an equipment which will be in every respect a model of its kind.

Primarily this is to consist of three Allis-Chalmers steam turbines, operating condensing, at 1,800 revolutions per minute, direct-connected to 3-phase, 60-cycle, alternating-current generators, of the same company's design and build, which have a rated capacity of 3,300 horsepower, in addition to which there will be a 75-kilowatt Allis-Chalmers engine-driven generator with belted exciter, for night lighting, two other Allis-Chalmers exciters for the main generating units, and various auxiliary apparatus.



The steam-generating equipment consists of twelve 72-inch boilers, each with 20-foot tubes, built by the Bigelow Co., of New Haven, Conn. These are to be installed in batteries of four. Steam will be supplied to the turbines at 150 pounds pressure, and superheated at 125 degrees F. by Foster superheaters. Natural draft will be provided for the furnaces through a stack 9½ feet in diameter and 200 feet in height. No forced draft will be needed. When the plant is finally extended to the full capacity of 10,000 horsepower, which it has been laid out for, another large chimney will be erected on foundations already built for it.

The arrangements for handling coal at the plant are thoroughly up-to-date. By means of a spur track from the railroad, coal will be brought directly to the storage bins, whence it will be lifted by clam-shell hoists, electrically driven, and taken directly to the furnaces as needed.

At the outset the power generated at the new plant will be used principally to supply what is known as the "Upper Mill;" but provision is being made for the extensive application of electric motor drive throughout the entire establishment, divided as follows: yarn mill, 1,500 horsepower; upper mill, 3,000 horsepower; lower mill, 3,000 horsepower; and new mill, 3,000 horsepower.

A switchboard for controlling the entire equipment will be put in at the time the first Allis-Chalmers turbines are installed. This consists of the usual complement of generator, exciter, voltage-regulator panels, etc., with distributing panels for the full motor load mentioned above.

The power plant will comprise three distinct parts, viz., a two-story generator room, 79 feet by 25 feet; a one-story boiler house, 209 feet by 83 feet, and a coal storage house, 209 feet by 52 feet. In the accompanying illustration is shown a view of the exterior of the station, which is to be of steel, brick and concrete construction, with column of terra cotta to serve as the main piers. Granite will be used in the window arches and for facing courses. The foundations consist of reinforced concrete piers, which are being put in by the New England Foundation Company, surmounted by granite and brick laid in cement.

MUNICIPAL ELECTRIC LIGHT PLANT FOR FRANKLIN, LA.

Contract has just been let to Muralt & Company, engineers of 114 Liberty Street, New York, for a complete modern municipal electric light plant for the town of Franklin, La. It will be of sufficient capacity to furnish electric light to the 4000 or more inhabitants and electric power to several sawmills and sugar refineries. In addition there will be a street lighting system of twenty-five arc lights and forty incandescents. The power house will contain the most approved type of machinery, Heine safety boilers, Harrisburg engines and Fort Wayne electric apparatus being used. The contract calls for getting out the machinery in three months and the complete plant is expected to be in operation early the coming fall. The plans and specifications were prepared by Warren B. Reed of New Orleans.

NEWS NOTES

TRANSMISSION.

Albuquerque, N. M.—A. D. Coleman, of this city, has perfected plans for the Forest Power Company for an electric power plant and transmission line and for an electric railway from Silver City to adjoining mining camps.

Rena, Nev.—Major A. J. Driffil, of Oakland, President of the Ely Electric Company, and Carl Lennhart, of Los Angeles. one of the principal owners of the company, who have been in this place for some days in the interest of the company, state that the company will immediately begin the construction of a 1,000-horsepower electric plant and of a large reservoir. The water for this reservoir will be furnished by Cave Creek and will be piped from the reservoir to the city, where a portion of it will be used for municipal purposes, the remainder being used to operate the electric power plant.

Oroville.—It has been learned that the work of developing the French Creek power plant will be begun shortly. Nearly four years ago a large amount of money was spent in surveys, road building and in purchasing water rights, machinery, etc., with the object of establishing a large power plant on French Creek, which is a tributary of the North Fork. The proposed plant was to be about twenty-eight miles from Oroville. The plant, as orginally proposed, was intended to generate from 16,000 to 20,000 horsepower, but it is understood that present plans call for a much larger plant. No details of the work have been given out, but a large corps of engineers is expected to be on the ground shortly.

Reno, Nev.—The California-Nevada Electric Power Company will soon begin operations in Nevada and in the border counties of California. R. E. Maynard, Vice-President of the company, and H. A. Lemmon, of the construction department. who were here last week, report that the company has already expended $250,000 in the purchase of reservoir sites, and that it now owns more than one-third of the taxable land in Alpine County, California. Eight power sites have already been secured, including Hope and Fish Valleys, which will be converted into reservoirs of large capacity. Four surveying parties and one construction crew are now actively engaged. As the season advances and the preliminary work is completed more men will be put to work. It is claimed that the power to be generated will be conveyed as far as Ely, Nev., over one of the longest transmission lines in the world. This will be unique in that it will carry the current at a voltage of 100,000.

San Francisco.—On account of the recent interruptions to the light and power service in San Francisco, the Pacific Gas and Electric Company is planning several important improvements which will benefit the service materially. Preparations are being made to install at Station A, in the Potrero, an additional 5,000-kilowatt, 11,000-volt steam turbine generating set. A 1,500-kilowatt generating set is to be removed from the same station to the company's steam relay plant at Petaluma. One of the 1,200-kilowatt direct-current generating sets from the old Jessie-street station, which was burned in February, 1906, is being installed in the Mutual Electric Light Company's plant at Spear and Folsom Streets, which is now under the control of the San Francisco Gas and Electric Company. A small storage battery is to be installed in Station A in place of the large one that was destroyed by fire. The gas system of this corporation is now in good working order in a number of outside cities as well as in San Francisco, under the supervision of E. C. Jones. The largest plant is at Martin station, six miles south of San Francisco, where there are two 2,000,000 cubic foot generating units and one 2,000,000 cubic foot gas holder. These supply the three big gas engines, each direct connected to a 3,000-kilowatt, 3-phase generator. These are kept in operation almost constantly, although they are intended to serve as a reserve plant. The company's gas business at Sacramento has been growing and an additional gas-holder, with a capacity of 500,000 cubic feet, is being constructed there. An additional gas-generator, with a capacity of 100,000 cubic feet, is also to be installed. Improvements and extensions are being made at the plants in Fresno, Santa Rosa and San Rafael. A 100,000-cubic foot gas-holder is being erected in the last named city. The gas business of Oakland and vicinity has doubled since the San Francisco disaster. An additional gas-holder, having a capacity of 1,000,000 cubic feet, is being constructed entirely above ground on property near the company's main plant in Oakland. A 30,000-barrel steel oil tank has been installed at Station B, near the corner of First and Market Streets. This tank was moved from the old Pacific Gas Improvement Company's works at North Beach, San Francisco. The removal required the use of two scows, the tank being 82 feet in diameter.

TELEPHONES AND TELEGRAPHS.

Eureka.—The Sunset Telephone Company has been granted permission to lay its wires underground in the business portions of the city. The work is to begin within one year.

Grass Valley.—The petition of residents in the Second and Third Road Districts of this County for the construction of a private telephone line along certain roads of the county, has been granted.

Oakland.—The Home Telephone Company of Alameda County has levied a second assessment of 15 per cent on the capital stock of the company for purposes of constructing the plant in Oakland and vicinity. As 40 per cent of the capital stock was originally paid in and one 15 per cent assessment has already been paid, the present assessment makes a total of 70 per cent so far called for. The Los Angeles Home Company is alleged to have built its system on approximately 40 per cent of the capital stock.

ILLUMINATION.

Auburn.—A. D. Fellows has drawn the plans for the main building of the Auburn Gas Works.

Oak Park.—The Sacramento Electric, Gas and Railway Company is laying gas mains through Oak Park.

San Francisco.—The office of the Coast Counties Light and Power Company has been moved to 824 Merchants' Exchange Building.

Yuma, Ariz.—The Yuma Gas Company has begun to lay mains in this place, but has not yet announced having secured a site for its generating plant.

Fullerton.—Sealed bids will be received by the City Clerk up to August 26th, for a franchise to lay mains and pipes and to establish and operate a gas plant in this city. The right to erect street lamps also goes with the franchise.

ELECTRIC RAILWAYS.

Spokane, Wash.—It is announced that F. A. Blackwell contemplates building an electric line from Spokane to Coeur d'Alene.

Victoria, B. C.—News comes from the Quatsino mining district that the June Group copper mine will build a five-mile electric road to the Coast for the shipment of ore.

Walla Walla, Wash.—The Walla Walla Fair Association will ask the City Council for a franchise for an electric line from some connecting point on the city line to the fair grounds.

Spokane. Wash.—Jay P. Graves, of the Spokane and Inland Empire Railway Co., says his company has in contemplation the building of a line from Colfax to Walla Walla and the extension of their system from Moscow to Lewiston.

G. W. Talbot, of Portland, Ore., has resigned as Vice-President and Treasurer of the Corvallis & Eastern Railroad, to become Vice-President and General Manager of the Oregon Electric Railway of Portland, which is building an electric railway from Portland to Salem.

Walla Walla, Wash.—The Walla Walla Valley Traction Co. has commenced surveying for the extension up Pleasant Street, from the intersection of Whitman and Howard Streets, to the easterly line of East Walla Walla, the line to be completed by April 1, 1908.

PERSONAL.

New Westminster, B. C.—It is stated that the Stone & Webster interurban will effect a junction with the British Columbia Electric Co. near Lynden and thus gain access to Vancouver. Stone & Webster will give the northern road trackage rights, possibly to Seattle. Officials of the British Columbia Electric Co. make no denials, but say that the alleged enterprise is not yet ready for the press.

TRANSPORTATION.

Sacramento.—The Northern Electric Company has secured a lease on property on the corner of Eighth and J Streets on which it will establish its down town depot. The offices of the company will be established on Sixth Street, between J and K.

Salt Lake, Utah.—Plans for the erection of new car barns, shops, office buildings and a club house have been approved by President W. H. Bancroft and by the engineers of the Utah Light and Railway Company. The plans call for an expenditure of $635,639, and the work is to be commenced at once. The improvements will be made on the old Exposition Square, bounded by Sixth, Seventh East, Fifth and Sixth South Streets.

Vallejo.—Manager L. J. Perry, of the Vallejo and Napa Electric Road, is authority for the statement that his road is to construct an electric line into the city of Sacramento, making the Napa branch a feeder. The new road will leave the Napa road at a point near Napa Junction and will follow the Southern Pacific track to Cordelia and Suisun, and from the latter place it will take a short cut to Sacramento. To keep up with the Southern Pacific Company's proposed improvements in the service in this section of the State, it is understood that Hatch Bros'. Company, the Vallejo and Napa Interurban Electric Company and the San Francisco, Vallejo and Northern will combine and build one or more steamers to cost in the neighborhood of $250,000. The new steamer will carry about 2,000 passengers and will ply between San Francisco and Vallejo in less than ninety minutes.

WATERWORKS.

Petaluma.—The Petaluma Power and Water Company has a force of men at work building a concrete dam on Copeland Creek, northeast of this city, in the Sonoma Mountains. The dam will impound water that has heretofore been wasted and will increase the local supply.

San Francisco.—It is reported that water is running out of the Lake Honda reservoir of the Spring Valley Water Company faster than the pumping plant can refill it. This reservoir, which is located in the Almshouse tract, has a capacity of 33,000,000 gallons, or the supply for the entire city for one day at the present rate of consumption. With the completion of the new main from the Pilarcitos reservoir, in San Mateo County, the difficulty would have been cured and the supply of water would have been sufficient, but it is understood that the Spring Valley Company has abandoned its plan to repair that line, which has been out of commission since the earthquake. The Pilarcitos pipe line, which crosses San Bruno marsh, connected the Pilarcitos reservoir with the city distributing system. At the point where it runs over the marsh it was very seriously damaged by the disaster. After making an examination of the line, the company's engineers recommended that it be built around the marsh on firm ground. To make these repairs would have cost upward of $200,000, and this sum was not available after the fire. The company attempted to have the Board of Supervisors increase the sum paid to the city by this amount to meet the cost of the repairs and, though it was promised that the amount would be provided by the municipality in some way, nothing has been done. It is now rumored that the company is contemplating the disposal of its Calaveras system for between $17,000,000 and $18,000,000, which would put the company in sound financial shape and enable it to carry out improvements needed immediately. It is claimed that the loss of the Calaveras system would prevent the enlargement of the company's supply to meet further needs of the city.

OIL.

Bakersfield.—Deeds have been filed transferring to the Standard Oil Company rights to construct its proposed pipe line into the McKittrick oil fields, over the land of several property holders. The terms of the right of way include the customary telephone line.

Bakersfield.—As a result of the Buena Vista flood and the stopping of the train service to the Sunset oil fields, water and provisions are very scare there. The store of the National Supply Company has been closed, work on practically all of the leases has stopped and the oil producers will be heavy losers.

Bakersfield.—The first shipment of oil through the Standard Oil Company's pipe line, completed recently, will probably be run into the Midway fields within a week. A water well has been struck for pumping purposes and, as soon as the pumping machinery is installed, the filling of the large contract made by the producers of the field with the Standard Oil Company last February will be under way. The main line is of 8-inch pipe, while the branch lines are of 6-inch.

POWER AND LIGHT.

Chewelah, Wash.—F. G. Rauch, city clerk, opens bids August 1st, for a water works and electric light plant, 12,500 feet water mains, 4,000 feet laterals, etc.

Kalama, Wash.—The Kalama Electric Light and Power Company received $3,000 worth of copper wire. The new line is being established and three wires installed from the plant to this city. The total cost of new improvements this year will reach between $29,000 and $30,000.

Tacoma, Wash.—Bids received last Thursday for a city electric power plant will not be opened. The Commissioner will readvertise for bids to be opened July 31. This action was ordered by the Council on the hearing from George Milton Savage that he was preparing bids to submit, but would be unable to have them in at that time.

Puyallup, Wash.—Local capital, aided by Tacoma interests, has organized the Current Power Irrigation Company, which is to be incorporated with a capital stock of $1,000,000, under the laws of Washington. E. H, Rice and H. J. Waugh, of Tacoma, are president and vice president, respectively, of the company. The Puyallup River is to be utilized by the company.

Centralia, Wash.—W. A. Aldrich, of Tacoma, appeared before the City Council and asked for a franchise for illuminating and fuel gas privileges. If the franchise is granted Mr. Aldrich guarantees to have the plant completed and at least 5,000 feet of pipe laid within two years. The franchise is requested for fifty years, and the applicant guarantees that the price of gas shall not exceed $2 per 1,000 cubic feet.

Huntington, Ida.—The Idaho-Oregon Light & Power Company has seventy-five men engaged in preliminary work of building roads and ditches in order to get temporary power for running their compressors. He says they have also about completed a sawmill which will have a capacity of 30,000 feet per day. The dam will be built of concrete, sixty-five miles up the Snake River, in the Homestead Mining District.

Custer, South aDkota.—The largest operating company here is the Westinghouse Electric Company, working two mica mines, the New York and the White Spar, where thirty-five men are employed, besides the fifty operators that work at the mica factory at Custer. They are putting in an electric plant at the New York mine, with an engine of 250 horsepower, weighing sixteen tons. Joseph Pyne is in charge of this property.

Chehalis, Wash.—A company of San Francisco capitalists has a force of men employed in northwestern Lewis County on a project to develop an immense water power plant at Packwood Lake, in the Cascade Mountains, to the southwest of Mount Rainier. The work is in charge of Engineer H. K. Green. Many tons of supplies have been freighted into the lake, a trail having been cut for that purpose. Packwood Lake is a mountain lake of unknown depth, and the topographic conditions are said to be such that by tunneling about 300 feet through solid rock a flow of water can be had which will give 100,000 horsepower. It is stated that the company back of the scheme proposes to develop this power and transmit it to the Northwest cities.

Leavenworth, Wash.—The Great Northern Railway has made a start in the great enterprise of generating electricity for hauling trains through the Cascade Tunnel. Engineers and men are now on the ground to arrange preliminaries, such as camps, buildings, and such facilities as are required for building of dams. They are stretching a cable for use with boats. The two dams will be placed in the Wenatchee, one at about one-half mile up the Tumwater Canyon, the other about three miles above the first, at the foot of a small lake, thus impounding the waters of this rapid fall of the river will give an immense power at both places, opening many possibilities, not only for the utilization of the electricity in the present proposition, but will doubtless open the way for feeders to the railroad in the establishment of manufactories.

ELECTRIC RAILWAYS.

Ballard, Wash.—The Loyal Street Railroad Company, operating two miles of electric line in Ballard, will extend the system nine blocks to Golden Garden Beach. The franchise was recommended for passage.

Colfax, Wash.—Information is received that the Spokane & Inland is laying track at the rate of a mile a day. The track is laid to Steptoe station, nine miles north of Colfax. According to this, the Spokane & Inland will be running to Colfax at a much earlier date than heretofore reported.

Everett, Wash.—Local capitalists have filed articles of incorporation under the name of the Chelan Electric Company, with $500,000 capital stock, with the intention of building an electric railway from Wenatchee to the northern end of the State. The route followed starts at a point near Wenatchee, following the Columbia River Valley to Lake Chelan, thence north to Okanogan River, and from there to the end of the State. Lighting and water privileges for all towns along the Chelan River are included in the terms of the articles. J. T. McChesney is the president of the company, and E. C. Mony, secretary. Other trustees are H. P. Scott, of Wilmington, Del., J. A. Coleman and F. H. Brownell.

Caldwell, Ida.—The sale of the Caldwell Interurban line, consisting of seven miles of track and right of way to Deer Flat, valuable franchises and right to use Caldwell streets, to the Boise Valley Company, was closed recently. The property was valued at $75,000. The stockholders were H. D. Andrews, Walter Sebree, D. D. Campbell, G. Snell, J. B. Gowan, H. W. Dorman and J. H. Lowell. The representatives of the Boise Valley road were Robert Noble, Dr. Ustick, and Mr. Cherry. In making the transfer the Boise people agree to complete their line from a point near Meridian to Caldwell, within a year, and to connect here with the Deer Flat line, which will be electrified. It is understood an extension will be put in to Roswell, also to Warm Springs.

The Standard Electrical Works, 60 Natoma Street, San Francisco, Cal., announces their appointment as Pacific Coast selling agents for the Couch & Seeley Company's telephones and annunciators. They have given up the agency for the De Veau telephones, and quote a discount of forty per cent. on apparatus on hand.

FINANCIAL.

San Francisco.—The annual meeting of the California Street Cable Railway Company, which was to have been held this week, will not take place until next month.

Oakland—Interests in the Owens River Water and Power Company, represented by Edson F. Adams, have settled the stockholders quarrel in that corporation by purchasing for more than $300,000 the stock held by those who recently contested an assessment of 2 cents per share. An injunction suit in the Superior Court to prevent the sale of delinquent stock has been dismissed.

Reno, Nev.—The City Council of Reno has unanimously adopted a resolution, prepared by City Attorney King and presented by Mayor Kirman, citing the officials of the Reno Power, Light and Water Company to appear and show cause why the water, electric power and gas rates of the city should not be reduced. Mayor Kirman is an advocate of lower power, gas and water rates. The officials of the company state that they will fight any attempt to reduce the rates.

Sacramento, Cal.—There is a rumor here that the owners of the United Railroads of San Francisco and Patrick Calhoun have all but closed a deal for the taking over of the local street railway system, now owned by the Pacific Gas and Electric Company. John Britton has refused to deny or affirm the report, but it is claimed that the proposed loan of $1,500,000 now being negotiated in New York is for the purpose of taking over this property, and that the present owners desire to obtain the funds needed to build a large power plant at French Creek, in Butte County, to meet the competition of the great Western Power Company.

Redding, Cal.—Thirty-four stockholders of the Pacific Power Company met here on July 8th to discuss the affairs of that corporation and to decide upon plans for the future. A. A. Martin acted as secretary. He also made a report upon the condition of the company as he found it upon taking charge after the departure of President Whitehead. A resolution was adopted making Mr. Martin Vice-President and General Manager. He thus takes active charge of the work in place of President Whitehead, who still retains the title of President. The stock of the latter has been placed in the hands of eleven other stockholders who have control of it. At the meeting the matter of raising $65,000 for the completion of the work and the building of a line into Red Bluff was taken up. Of this amount $30,000 was pledged at once. A number of prominent Red Bluff citizens were present and agreed to finance the matter. Work will be started at once.

San Francisco, Cal.—The Board of Directors of the Pacific Gas & Electric Company has levied an assessment of $3,000,000 on the capital stock of the company. The assessment on each share will be $10. There are 100,000 shares of preferred and 200,000 shares of common stock. The expenses of the company for the last year and a half are roughly figured at $7,000,000, and it was the decision of the Directors to assess the shareholders rather than borrow the amount. According to the statements of the officials of the company, the cost of rehabilitation has been very large. In addition has come the building of new power houses throughout the State and the purchase of smaller companies and the whipping of them into shape to supply the cities and towns of the State. Not the least of the company's troubles has been the lowering of the gas rate to the consumers of San Francisco. Fully seventy per cent. of the company's shareholders were represented at the meeting, when it was decided to levy the assessment, and no complaint is anticipated.

San Francisco, Cal.—The United Railways Investment Company is about to issue $1,500,000 three-year, six-per-cent. notes. A total issue of $3,000,000 will be authorized at a meeting of the Board of Directors, which is to be held in Jersey City, N. J., on July 23rd. Proxies guaranteeing the authorization of this issue have been secured by Ladenburg, Thallman & Co., the bankers who control the United Railways, and already underwriting has been secured for the $1,500,000 to be issued now. The notes to be issued will be secured by the deposit of notes of the United Railroads of San Francisco, of which the United Railways Investment Company is the holding company, and of the San Francisco Railway & Power Company. President Patrick Calhoun makes the following statement regarding the issue: "The issue of notes is a part of the financial plan of the investment company that was outlined sometime ago. The money will be used to carry the United Railroads of San Francisco through the present industrial crisis. The conditions prevailing here are of a nature that makes the future uncertain, and we are business men enough to be prepared to protect our property and to be prepared for any and all emergencies."

TELEPHONES.

Palouse, Wash.—The Interstate Tel. Co. has purchased a site, and will at once build a one-story brick building for an exchange.

Bonners Ferry, Ida.—President M. A. Phelps states that the Interstate Tel. Co. will commence a line to this place in a few days.

Garfield, Wash.—A meeting was called by Herman Curtis to discuss proposition of Pacific States Tel. Co. to take over all rural lines. Offer was rejected.

Wallace, Ida.—R. E. Leonard, superintendent of construction for Rocky Mountain Bell Tel. Co., is installing new system in the new telephone building.

Colfax, Wash.—Another mass meeting is called for July 23, to discuss proposed telephone franchise. Mayor Pattison says the company proposes to install a central-energy system at a cost of $40,000.

Olympia, Wash.—The County Commissioners granted the Northwestern Long Distance Telephone Company the right to construct telephone lines along the county roads in Thurston County until a franchise for this company can be prepared for the consideration of the Board.

INCORPORATIONS.

Fresno.—The Summit Oil Company has been incorporated here with a capital stock of $250,000 by S. R. Adams, A. E. Webb, S. D. Porter, E. W. Robinson and W. C. Reilly, all of Coalinga, Cal.

Willows, Cal.—The Snow Mountain Electric Power Company has been incorporated here with a capital stock of $500,000 by C. H. Glenn, C. R. Wicks, A. S. Lindstrom, B. H. Burton, T. Harrington, M. J. Boggs and H. C. Stovall